

U.S Army Corps of Engineers

New York District



ST. ALBANS VETRANS ADMINISTRATION EXTENDED CARE FACILITY QUEENS, NEW YORK

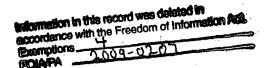
Prepared Under:

CONTRACT NO. DACW33-97-D-0002 DELIVERY ORDER NO. 0009

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Shaw ™ Stone & Webster, Inc.
Shaw Environmental & Infrastructure, Inc.





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Asbestos Variances

APPENDIX F

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ACP Access Control Point

ACM Asbestos Containing Material
ALARA As Low As Reasonably Achievable
DCGLs Derived Concentration Guideline Levels
DERP Defense Environmental Restoration Program
DOT United States Department of Transportation

D&D Demolition and Decontamination FUDS Formerly Used Defense Site

FSS Final Status Survey

IDW Investigation -Derived Waste

MARSSIM Multi-Agency Radiation Survey and Site Investigation Manual

NED New England District

NRC Nuclear Regulatory Commission

NYC New York City

PCM Phased Light Microscopy
RMA Radioactive Material Area
RSO Radiological Safety Officer
SAP Sampling and Analysis Plan

SOW Scope Of Work

SSHP Site Safety and Health Plan

SU Survey Unit

S&W Stone & Webster, Inc.

TEM Transmission Electron Microscope
TSDF Treatment Storage and Disposal Facility
USACE United States Army Corps of Engineers

USACE NAE United States Army Corps of Engineers New England District

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VA United States Veteran's Administration

VAT Vinyl Asbestos Tile

VAECC Veteran's Administration Extended Care Center

WESTON Roy F. Weston Company, Inc.

WP Work Plan

WMP Waste Management Plan

Y-90 Yttrium

EXECUTIVE SUMMARY

In compliance with USACE Contract DACW33-97-D-0002, Delivery Order 009, Stone & Webster provided decontamination, sampling and analysis, waste transportation and disposal, final status survey, and final restoration services at the St. Albans Veterans Administration Extended Care Center Facility (VAECC), located in Queens, New York.

Stone & Webster utilized a small disadvantaged business enterprise, Cabrerra Enterprises to provide daily radiological support services during the field remediation phase of the project. Additionally, Cabrerra provided the Final Status Survey (FSS) in accordance with guidance as outlined in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and Stone and Webster documents "Work Plan for Decontamination and Decommissioning" and "Sampling and Analysis Plan for Decontamination and Decommissioning."

Stone & Webster utilized a small business, Franklin Environmental, to provide radiological decontamination, asbestos abatement, and waste transportation during the field remediation phase of the project. Additionally, Taylor Environmental performed asbestos air monitoring and related professional services.

This project included the following activities:

- 1. Decontamination and decommissioning (D&D) of three survey units (SU001, 002, 004) and piping beneath one survey unit (SU005) within 90 of the St. Albans VA Center.
- 2. Characterization and disposal of Class A and Class B radioactive waste generated from the D&D activities within Building 90.
- 3. Removal and disposal of asbestos containing materials generated from activities within the SUs in Building 90.
- 4. Collection and analysis of asbestos compliance samples for site clearance, personnel monitoring, and area monitoring.
- 5. Performance of a Final Status Survey (FSS) for SU001, 002, 004, a portion of 005, and 008 within Building 90.
- 6. Preparation of a Remedial Action Report.

The five survey units (SU) included in the project, SU 001, 002, 004, 005 and 008 were located in Building 90. D&D activities were conducted in SU 001, 002, and 004. The original scope of work included the removal of a drainpipe from SU001 to SU002 that was present beneath SU005. The pipe was to be removed without disturbing the floor of SU005 by pulling the pipe into SU002. Stone & Webster discovered that this was not possible due to the unanticipated presence of tees connected to the drainpipe. In order to access the pipe, the floor for SU005 required removal. The floor tiles along the pipe chase were determined to contain asbestos. The drainpipe and soil beneath the floor of SU005 was removed.

As detailed in Section 4, SU005 and 008 were divided into smaller SU designated as SU005A and 005A and SU008A and 008B for purposes of the FSS. A FSS was

performed within all five SU, clearing the areas for future use. An underground pipe that allowed the transfer of waste liquid from the ejector pit in SU002 to an outside manhole was surveyed and the results are contained in the Draft FSS Report included as Appendix B of this document.

The waste disposed as radioactive waste was classified as Class A or Class B waste. The initial scope of work has assumed that all waste would be Class A waste and waste profiles and acceptance was premised on this assumption. Upon completion of the D&D activities USACE determined that, based on the best available data and several iterative calculations with various assumptions, four drums of waste were disposed as Class B waste. The Class A waste (307 drums) were transported directly to Envirocare in Utah. The four drums of Class B waste were transported to GTS/Duratek, a treatment, storage, and disposal facility (TSDF) that accepts small quantities of waste for bulking prior to shipment to a permanent TSDF. The drums of Class B waste were shipped to Barnwell Waste Management Facility from GTS/Duratek on October 31, 2002.

The Draft Final Status Survey (FSS) was prepared and submitted to USACE for submission to the NRC in December of 2000. The FSS is required by the NRC to document that all radiological waste materials were removed in accordance with MRSSIM guidance.

1 INTRODUCTION

1.1 Background

The St. Albans Veteran's Extended Care Center (VAECC) operated as a Naval Hospital prior to its acquisition by the Veteran's Administration (VA). The Naval Hospital provided nuclear medicine services under several Nuclear Regulatory Commission (NRC) licenses. NRC licensed activities ended with the termination of NRC license #31-00076-06 on December 31,1973. In 1976, the St. Albans facility was transferred from the Navy to the VA. The VA did not hold a radioactive materials license at St. Albans but did hold a NRC "Possession Only" Byproduct Materials License No. 31-02892-06.

In order to terminate the NRC license, a decontamination and decommissioning (D&D) approach was developed. The D&D methodology was derived in accordance with the Final Decommissioning Plan (Weston, 2000) and the requirements of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). The Final Status Survey (FSS) element of the Work Plan (WP) was developed using the guidance found in the Decommission Plan (Weston 2000), Draft Final Work Plan for the Radiological Characterization (S&W, 1998), and other applicable regulatory guidance documents including MARSSIM.

The objective for activities at the VAECC was to ensure that all cleanup criteria or derived concentration guideline levels (DCGLs), established in the Final Decommissioning Plan were achieved and that exposures to occupational workers and the public were maintained as low as reasonably achievable (ALARA). Upon NRC approval of the Final Status Survey (FSS), the areas will be restored to a condition that will allow for a safe work area for future activities. Currently, the future use of the areas within Building 90 of the VAECC is uncertain.

1.2 Purpose

This Remedial Action Report documents the (D&D) tasks performed at the VAECC. This report has been prepared in accordance with the USACE/NAE Contract Number DACW33-97-D-0002 Statement of Work for Delivery Order Number 0009, Radiological Contamination Removal Action, St. Albans Veterans Administration Extended Care Center, Queens, New York, and the approved WP and Decommissioning Plan.

1.3 Document Organization

Section 1.0 discusses background information about the Site, the purpose of the D&D action and organization of the Remedial Action Report. Section 2.0 presents a detailed history of the Site along with a summary of previous field investigations. Section 3.0 summarizes the asbestos abatement aspects of the D&D action in addition to documentation of air monitoring activities for this project. Section 4.0 outlines the rationale and methods used during the decontamination and removal activities. Section 5.0 summarizes how the waste material was handled and stored onsite and the factors for determining the appropriate off-site disposal location for each type of waste. Section 6.0

describes planned site restoration activities. Section 7.0 provides the list of reference documents for this report.

2 SITE INFORMATION

2.1 Site Description

The Veteran's Administration Extended Care Center (VAECC) is located on an approximately 55-acre site at 179th Street and Linden Boulevard in Queens, New York and includes 15 buildings. As defined by the scope of work (SOW), this project site includes survey units 001, 002, 004, 008, and a portion of 005 within Building 90 and Corridor 45 for D&D activities. See Figure 2-1 for the location of the facility and Building 90 and Figures 2-2 and 2-3 for the specific survey unit within Building 90 included in this project.

2.2 Site History

The Navy operated the St. Albans facility as a Naval Hospital prior to its acquisition by the VA. While operating as a Naval Hospital, nuclear medicine services, including radiological therapy, were executed under several NRC licenses beginning in 1950. The original license allowed the use of Yttrium-90 (Y-90) for tumor treatments and an amendment to the license allowed the use of liquid Y-90 for leukemia treatment. In December 1959, the radiological laboratory submitted an application for Strontium-90/Yttrium-90 in order to produce the necessary Y-90. The request was approved and liquid Sr-90 was introduced to the site.

According to site personnel in late 1962, a spill of liquid Sr-90/Y-90 occurred inside the exhaust hood in the "hot" laboratory. The spill was not reported and sampling was not conducted to determine the extent of the spill. The standard operating procedure utilizing Radiacwash 2-3 times a week was used to remove the contaminants. In 1964, results of a smear test reported contaminants within background levels. This spill was the only recorded spill at the facility in the area of the project site.

The NRC licensed activities ended with the termination of NRC license # 31-00076-06 on December 31,1973. In 1976, the St. Albans facility was transferred from the Navy to the VA. The VA did not hold a radioactive materials license at St. Albans.

2.3 Summary of Previous Investigations

In May of 1992 the USACE, while performing a review of former Department of Defense sites, visited St. Albans and conducted a visual survey of the radiological laboratories. During the visual survey, the Corps identified areas with the potential for elevated levels of radiological contaminants. After this visual survey, the VA radiological safety officer (RSO) submitted smear samples to a laboratory for analysis for radiological contaminants. Analytical results confirmed the presence of radiological contaminants in the samples.

In July of 1992, Teledyne Isotopes performed an initial survey for radiological contaminants. Sample results indicated the presence of radiological contaminants in samples from the floors, drain lines, and equipment in the "hot" laboratories. Teledyne identified the contamination to be Sr-90. Teledyne Isotopes issued a report titled

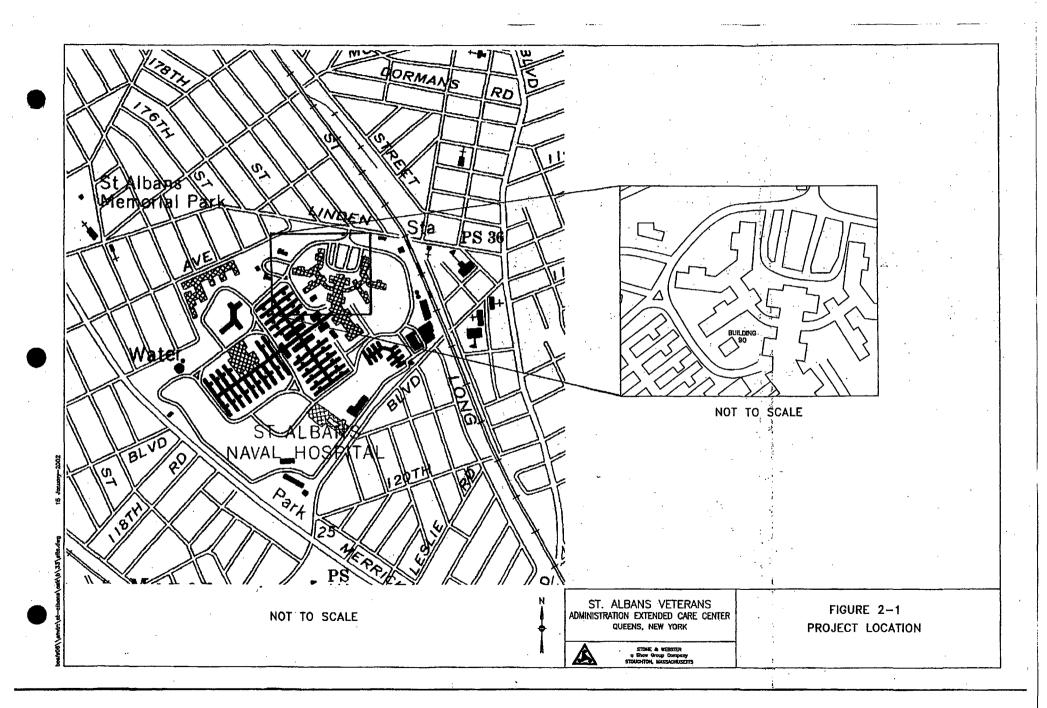
"Radiation Safety Survey for VA Medical Center Queens, NY, July 1992" to the VA summarizing the survey results and data.

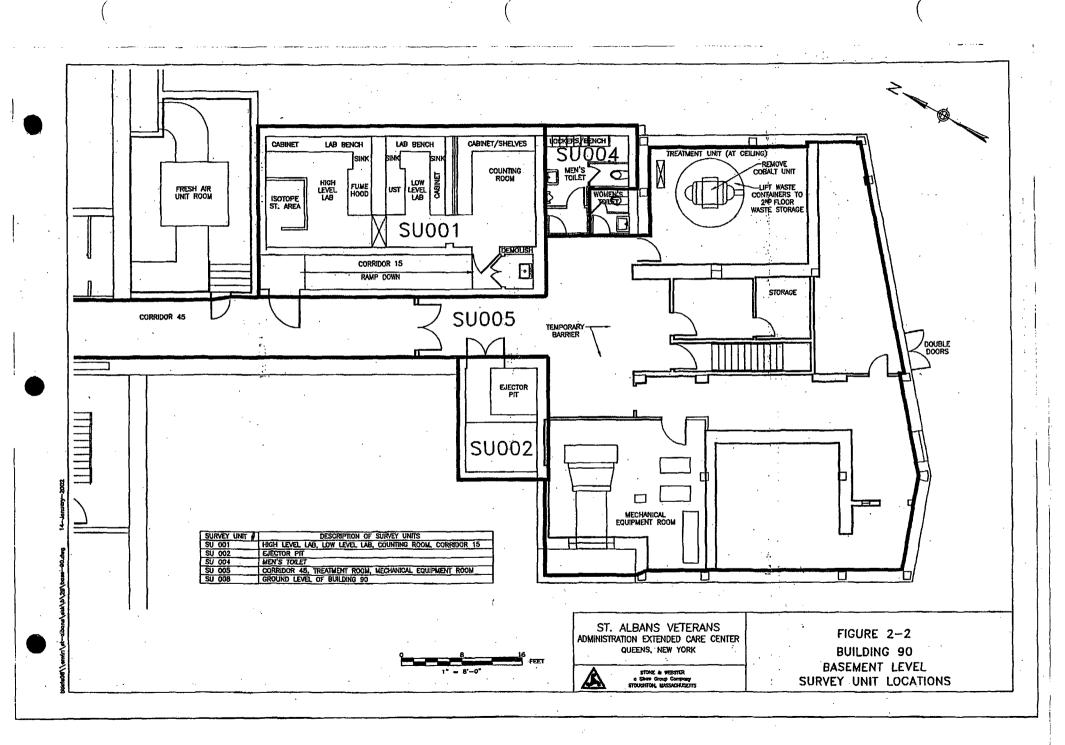
In August 1992, Teledyne removed the floor drains, exhaust hoods, floor tiles, bench tops, and numerous other items identified in their report from the laboratories. In October of 1992, Teledyne used jackhammers to remove the concrete floor surrounding the main floor drain for the emergency shower in the High Level laboratory. The drain to the first 90-degree elbow was removed. The drain line was traced to the Ejector Pit room. Contamination was detected in the Ejector Pit room and Teledyne recommended an expanded survey and decontamination of other rooms.

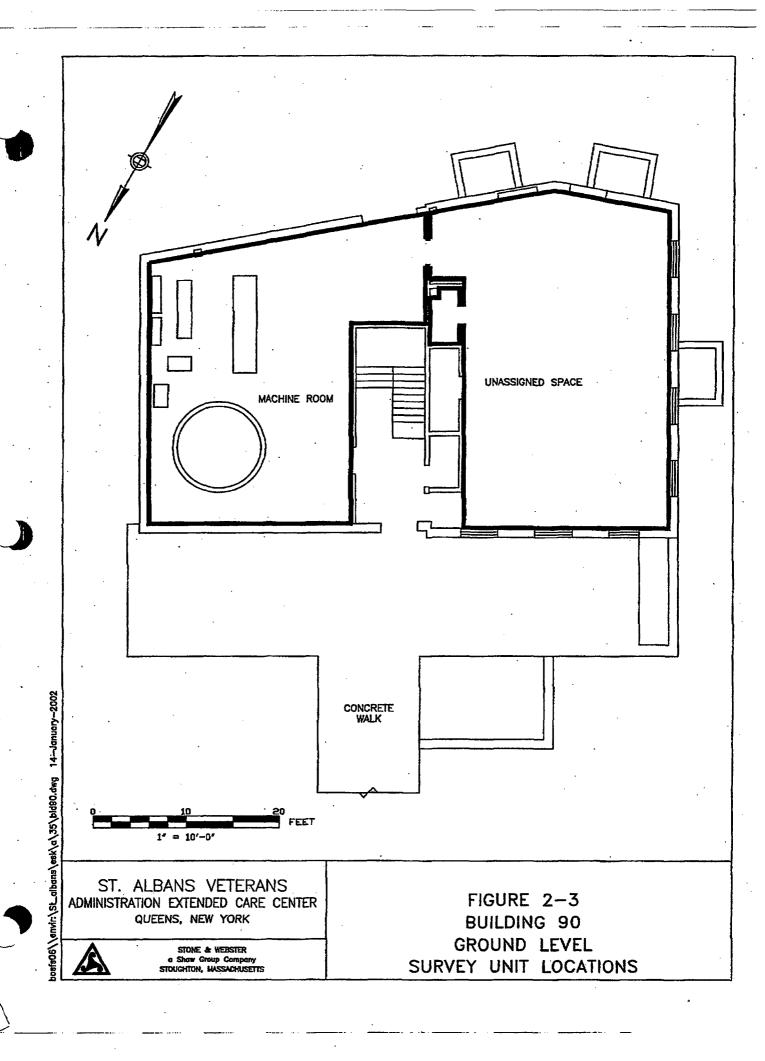
In September 1997, Ogden surveyed the nuclear labs and the ejector pit located adjacent to Corridor 45. They identified radioactive materials in excess of NRC release criteria (Northern Ecological Associates, Inc. Report titled "Data Collected at DERP-FUDS Saint Albans Extended Care Center Queens, NY," prepared by Ogden Environmental and Energy Services Co., Inc.). The Ogden report recommended expansion of the scope of the survey.

Stone & Webster prepared a records review report ("Historical Site Assessment - Records Review Report for the St. Albans VAECC", April, 1998) for the USACE, chronicling the use of radioactive materials at the St. Albans facility. The Stone & Webster report identified areas in Buildings 64, 90 and 91, requiring characterization and remediation to support unrestricted release of the St. Albans facility.

In 1999, Roy F. Weston Company, Inc. (Weston), conducted characterization surveys of buildings 64, 90 and 91 (Weston 1999a). Data generated from previous characterization efforts, supplemental tritium surveys and small-scale decontamination activities, demonstrate that Survey Units (SU) 003, 006, 007, 008 and 009 meet the DCGLs for St. Albans and requirements for FSS (Weston, 1999b). Survey Units 001, 002 and 004 and the pipe beneath SU005 (located in the Building 90 basement) contained radiological materials that required remediation and a comprehensive FSS for SU 001, 002, 004, and the revised area of 005 (See figures 2-2 2-3, and 4-1 for locations of these SUs).







Chronology of Events

Table 2.1 Chronology of Events

Date	Event
Jul.1992	DOD identifies site as requiring decontamination
Apr. 1998	Stone & Webster performs Historical Site Assessment
Apr.1999	Roy F. Weston Company conducts characterization survey of
	Bldgs. 64, 90, 91
Apr. 1999	Weston Decommissioning Plan accepted by NRC
Aug. 2000	Stone & Webster Work Plan Approved
18 Sep. 2000	Stone & Webster mobilization to site.
18 Sep 22 Dec. 2000	D&D activities conducted for SU001, 002, 004 and 005
19 Sep 23 Oct. 2000	Asbestos sampling and abatement conducted
11 Jan. 2001	Shipment of 307 drums of Class A Waste to Envirocare
4 Dec. 2000-13 Jan.2001	FSS is conducted for D&D areas
16-17 Jul. 2001	Pipe chase surveyed and FSS completed
18 Jul. 2001	Shipment of four drums of Class B waste to GTS/Duratek
19 Jul. 2001	Site Demobilization
18 Dec. 2001	Submission of Draft FSS to USACE
21 Jun. 2002	Complete Restoration of concrete floors
31 Oct. 2002	Shipment of four drums of Class B waste from GTS/Duratek to
	Barnwell Waste Management Facility

4 DECONTAMINATION AND REMOVAL PROCEDURES

4.1 Objectives

The project objectives consisted of the decontamination of SUs that contained radiological contaminants above the NRC approved DGCLs. These objectives were achieved using D&D methodologies that ensured exposures to occupational workers and the public were within ALARA guidelines.

Radiation work permits and radiation surveys were completed in accordance with the Work Plan. Copies of the permits and surveys are in Appendices D and E respectively.

Details of the radiological clearance activities are detailed in the Final Status Survey (FSS) prepared for the NRC. The FSS was submitted under separate cover in December of 2001. All survey units that were decontaminated and decommissioned (D&D) (SU001, 002, 004 and the pipe line beneath SU005) and used to temporarily store drummed D&D wastes (SU008) were cleared as not containing radiological materials in excess of the DGCL's.

4.2 Alterations to Work Plan

The following were general alterations to the WP.

- SU001, as shown in Figure 4-2, was divided into two areas designated at SU001A and SU001B to be compliant with MARRSIM guidelines.
- The BROCK remote hammer was too large to fit into the existing access points to the the Isotope Area of SU001. Stone & Webster switched to electric jackhammers as the means to demolish the concrete.
- The Control Room for the X-Ray Treatment Room located in SU005 was cleared of all contents. The contents were surveyed and released as non-radioactive waste. The area was final status surveyed as part of SU005.
- At the direction of the USACE, lead tiles were removed from SU001A, (isotope storage area) and decontaminated to avoid classification as a mixed waste. The decontaminated lead tiles were sent to a local recycling facility.
- At the direction of the USACE, the X-Ray unit was removed from the 1000kvp Treatment Room disposed as clean waste.
- SU005 was reduced in area, as indicated by Figure 4-1. The areas removed from the scope of this project had previously been cleared by a final status survey performed by Weston and were not impacted by S&W's project activities.
- SU008 was sub-divided into two areas SU008A and SU008B, as indicated in Figure 4-3. This field change was made to allow clearance of SU008A while waste was stored in SU008B to coordinate the waste-shipping schedule with the FSS.
- At the direction of USACE, four drums of radioactive waste were reclassified from Class A disposal criteria to Class B. The original scope of work had assumed that all waste would be disposed in accordance with Class A disposal criteria. Details of the reclassification are contained in Section 5 of this report.

4.3 Delineation Work Zones

The Radiological Control Areas (RCA) were established at the access point to each work area. The RCA included SU001, SU002, SU004 and a portion of SU005. These areas were clearly marked with signing stating that the area was an access-restricted area. In order to create an air tight RCA, all ventilation ducts were secured and polyethylene sheeting and barriers was placed to restrict access. Decontamination areas were established and the access control points (ACP).

4.4 Removal of Contents and Decontamination of SU001

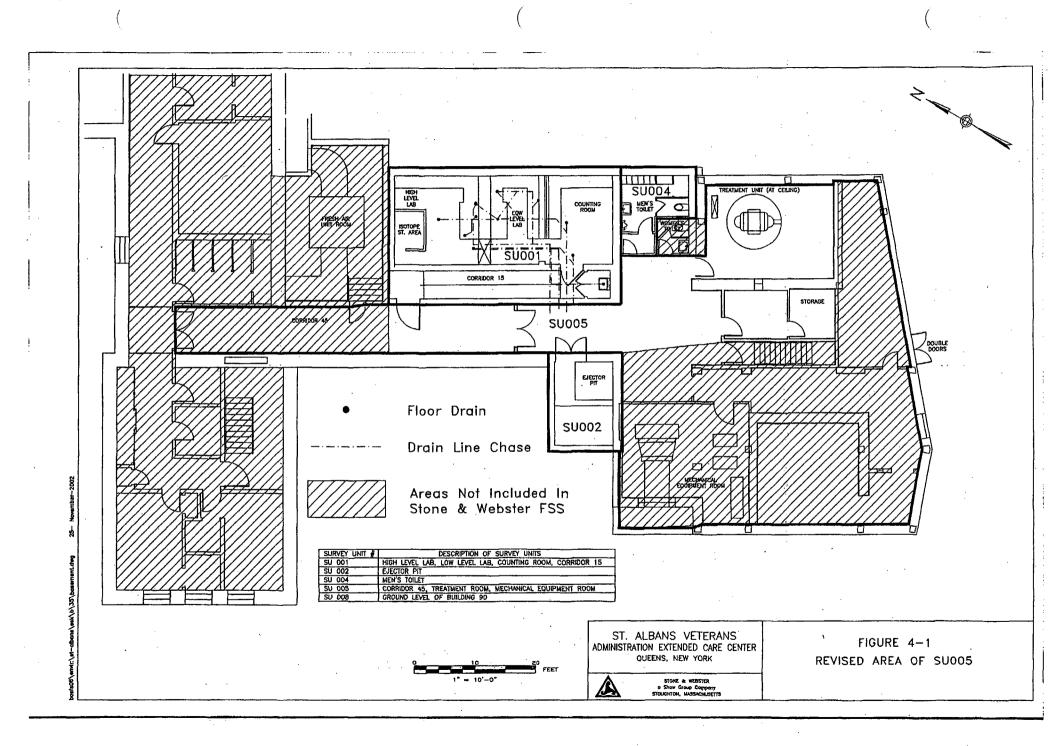
The D&D activities in SU001 included the Isotope Area, the High Level Laboratory, the Low Level Laboratory, the Counting Room, and Corridor 15. The Decommissioning Plan called for the removal of non-load bearing interior walls. After review of the building's plans and a site tour, Stone & Webster's structural engineer recommended against removal of the walls. The presence of the walls increased the surface area within SU001 that required surveying. To comply with MARSSIM guidelines SU001 was divided into SU001A and SU001B.

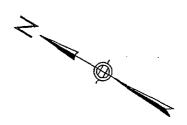
All loose debris contained in the laboratories (glassware, loose equipment, miscellaneous debris and two drums of tiles) were placed in the appropriate containers for disposal. Additionally, all appliances and furniture from the laboratories and counting room were removed. Items such as laboratory benches, shelves and fume hoods were disassembled to the extent practical. Initially, efforts were made to decontaminate and separate the debris and furniture contained within SU001, this practice was time consuming and required extensive manpower and was discontinued at the direction of the USACE. Additionally, the amount of debris contained in SU001 exceeded estimated quantities in the SOW and increased the amount of waste generated from this SU.

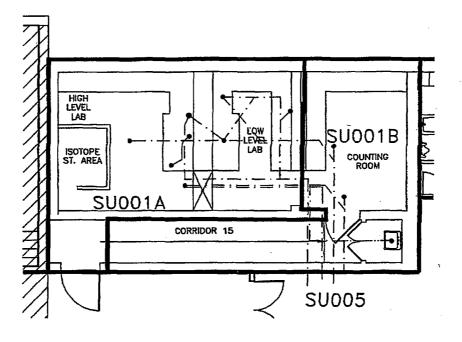
Prior to the removal of the cabinetry in SU001, all waterlines were tested to confirm that the lines were disabled. However, during the removal of the cabinetry in High Level Laboratory an unanticipated waterline still charged with water was cut. The waterline connected the sink area of laboratory to the main line in SU001. The water feed line was secured in position with hydraulic cement and an open drain hole in laboratory floor was sealed to prevent the water from migrating to the drain. To permanently plug the pipe, the concrete around the pipe was removed and a permanent plug soldered in place. This repair successfully prevented additional water leakage. The water leak generated approximately 100 gallons of potentially radiological impacted wastewater.

The water was collected, sampled, and analyzed for strontium 90, carbon 14 and tritium. Analytical results of the samples indicated that the collected water did not contain contaminants of concern above DGCLs and was evaporated on site at the direction of the USACE.

Radiological contamination from past practices had penetrated several inches into the laboratory concrete floors. After several different concrete removal methods were tested Stone & Webster determined that using a jackhammer was the most effective removal method. In order to manage the amount of radiological dust generated by the

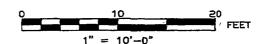






• Floor Drain

Drain Line Chase



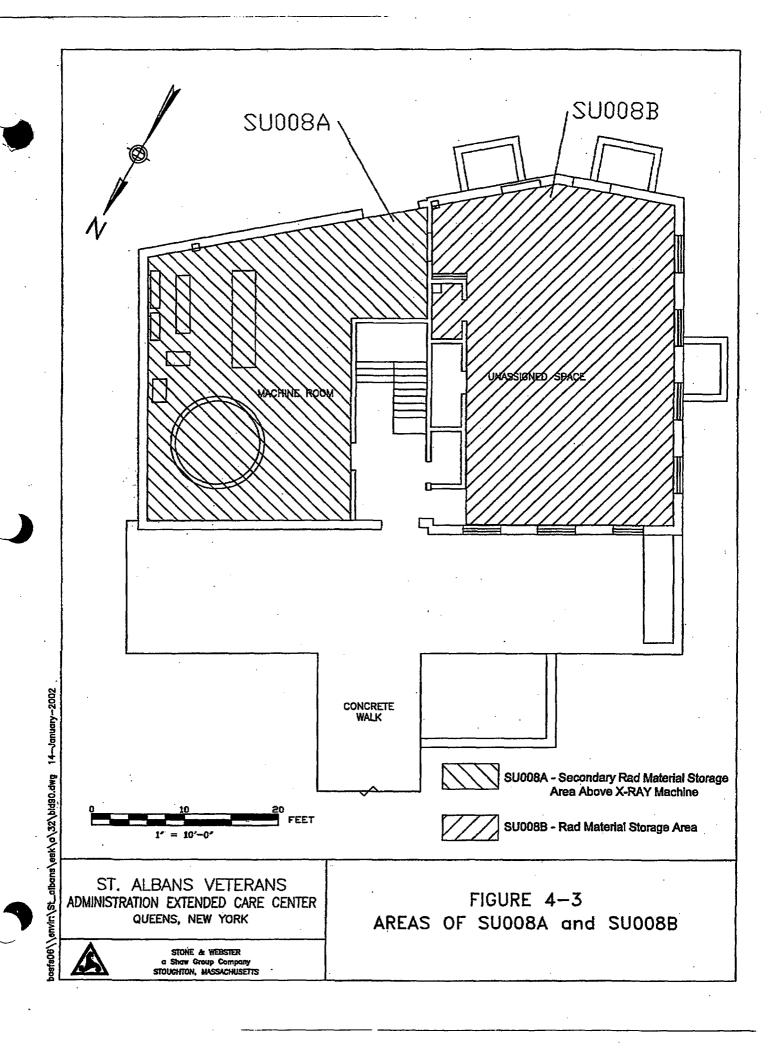
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FIGURE 4-2 AREAS of SU001A and SU001B



STONE & WEBSTER
a Show Group Company
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jackhammer, a HEPA vacuum was attached to the bit. The benefits of using a jackhammer included increased maneuverability and overall productivity. All of the removed concrete was placed in appropriate containers and stored in the RMA prior to transportation for disposal at the approved facility.

Following the removal of the concrete floors in SU001A and 001B the main drain line, as shown on Figure 4-4, was removed due to the presence of elevated levels of radiological contaminants. This drain line was the main drain that led from the Lab area drains (sinks and floor drains) to the ejector pipe. The estimated run of pipe was 24 feet leading through the Labs to the ejector pit. After review of the waste classification guidelines in 10 CFR 61.55, USACE directed Stone & Webster to classify this waste as Class B Waste. The drums containing waste pipe materials were externally scanned with a frisker, removed, and placed in the waste staging area. A total of three drums were used for pipe storage from this area.

Lead shielding tiles were removed from SU001A. The tile was decontaminated to prevent classification as "Mixed Waste". Decontaminated lead tile was sent to a local recycling facility as described in Section 5.2.3 Recycling of Lead Tiles.

After the completion of the D&D activities and the asbestos abatement, SU001 was considered completely gutted. All walls with in the SU were stripped down to concrete. The area was then sealed to prevent recontamination.

4.5 Removal of Contents and Decontamination of SU 002

SU002 consisted of the Ejector Pit and all its contents. Initial inspection of the room revealed evidence that the room had been flooded. This evidence included the discoloration on two stainless steel tanks. The Decommissioning Plan indicated that the Ejector Pit Room contained one 50-100 gallon tank; the initial inspection revealed one 400-gallon tank and one 350-gallon tank.

The cleaning and removal of the interior piping from SU002 was conducted in accordance with the WP. The removal of the tanks however required more effort then anticipated because of the additional tank in the area. The cutting of the large stainless steel tank was difficult to perform. The use of various electric and pneumatic cutting tools was investigated with the best alternative being an electric reciprocating saw.

Upon completion of the D&D activities in SU002, all hardware was disconnected, removed, characterized, and decontaminated or disposed. Radiological waste items were placed in 55-gallon drums. Non-contaminated items were separately removed and disposed.

Contaminated drain lines, which were elevated into the slab, were removed, sectioned, and capped. The drain lines were sectioned using an electric saw with a cast iron cutting blade, efforts were made to minimize the amount of dust created during this activity. The contaminated drain lines were placed in 55-gallon drums. The four-inch cast iron pipe from the Ejector Pit Room to the outside sewer line was difficult to survey for

contamination. Due to the size constraint of the pipe, a "pancake " frisker type probe (Ludlum 44-9), attached to an extension, was used to access the pipe. The survey was limited to 48 inches because of the length of the cord on the probe.

Stone & Webster determined that additional characterization of this pipe was necessary for the FSS. Stone & Webster conducted this sampling procedure in July 2001. Sample results indicated that the piping did not contain contaminants of concern above the DGCLs. The survey results are included in Appendix B, FSS report.

A total of thirty-five drums containing Class A waste consisting of piping, ppe, miscellaneous debris, stainless steel tank components, valve heads, HEPA filters, concrete and poly; and one drum containing Class B waste from the trap of the 4" line were removed from the area and placed in the waste staging area. (See Appendix C for detail on waste log)

Upon completion of the D&D activities, the area was sealed until the FSS to prevent recontamination.

4.5.1 Sampling of Manhole

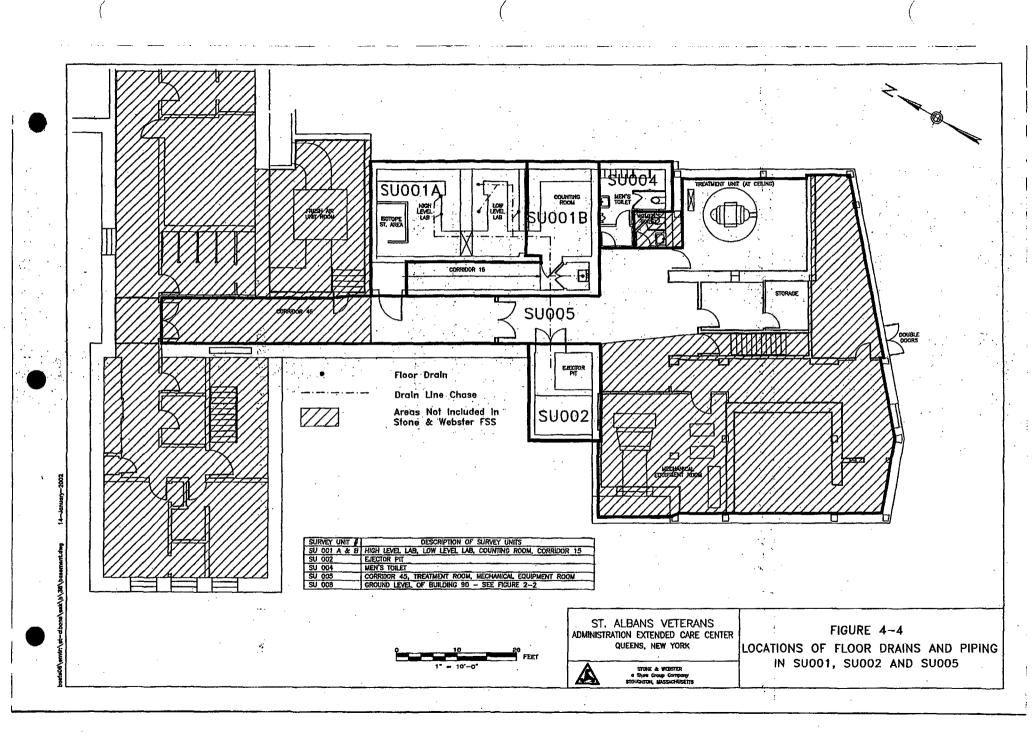
Stone & Webster sampled the manhole that was the waste discharge location for the four inch cast iron pipe running from the Ejector Pit Room to the outside sewer line. Four samples were extracted from the manhole (one sample each at the 1 foot, 2 feet, and 3 feet levels and one sludge sample at base of the manhole). Field screening indicated that the highest radiological concentration (slightly above the site background level) was from the sludge sample at the base of manhole. This sample was sent out for Sr-90 analysis with standard turn around time (30 days). The remaining samples were held in storage on site. The sample result did not contain detectable concentrations of Sr-90. The remaining samples were placed in drums with other compatible waste. Sample analytical results are presented in Appendix C.

4.6 Removal of Contents and Decontamination of SU 004

Activities at SU004 consisted of D&D operation in the men's bathroom in the basement of Building 90. All internal contents of the restroom, partitions, toilets, shower tile and fixtures, sink, etc., were removed and surveys taken to determine if the items contained radiological contaminants above the DGCLs. All material removed from the restroom was placed in drums.

Upon removal of the internal contents of the restroom, the floor tiles were removed using hand tools. The tile removal was conducted using methods that minimized the breaking of tiles and generation of airborne particulate to avoid the spread of contamination. The contaminated tiles and other materials were placed in four drums. Non-contaminated items were removed and disposed separately.

The concrete floor in the area of the men's toilet was scanned and areas determined to have contaminants above the DGCLs were removed. A total of nine drums of material were removed from this area.



The two floor drains in the men's room were characterized using a Ludlum 44-9 frisker type probe to determine the presence of potential contaminants. The drain screen and drain were determined to contain radiological contaminants above DGCL guidelines. The drain, up to 6 inches below grade, was removed and placed in a drum.

4.7 Decontamination of SU 005

Activities at SU005 consisted of accessing and removing of the drain line under Corridor 45 that connected the drain piping system through points in SU001 and SU002 and removing the contents of the control room adjacent to the teletherapy area. Jackhammers were used to remove the concrete. All slab concrete was disposed as non-hazardous construction waste. The exposed floor drain-line within the area was cut and characterized using a frisker. Approximately 12 linear feet of drain lines were removed, sectioned, and capped. The drain lines were cut using an electric saw fitted with a cast iron cutting blade. The drain lines with radiological contaminants were placed in three drums. Non-contaminated items were removed and disposed separate from the radiological containing wastes. The containerized waste was then sent to the access control point (ACP) to be released before temporary storage in the RMA.

Results of survey data and inspection of the drain line indicated the need for sampling of the soil beneath the drain line and frisker screening to determine if contaminants above DGCLs were present. Soil with radiological contaminants was placed in 12 drums. Noncontaminated soil was left in place. The containerized waste was then sent to the ACP to be released before being sent to the RMA for storage. The waste was subsequently transported for disposal at a licensed facility. Waste characterization forms and manifests are included in Appendix C.

4.8 Radiological Waste Clearance of SU008

SU008 was used for the temporary storage of drummed radiological waste generated from the D&D activities at SU001, 002, 004, and the pipe area beneath SU005. There was no waste reported to require D&D within SU008. The area of the waste storage was cleared with a FSS after removal of all the drums of waste.

4.9 Performance Standards and Quality Control

See Table 4.1 for objectives and performance results for decotamination and decommissioning activities.

Table 4.1

D&D Objectives and Performance Results

Remedial Action Objectives	Performance Results
Mobilize and prepare site for D&D activities.	Constructed temporary structures, verified walls to be removed, displaced treatment unit for access to ground level of BLDG 90.
Removal and disposal of contents of SUs.	SU 001 and SU004 were stripped bare of shelving, tables, etc. Two tanks in SU 002 were removed and disposed off-site. All drainage systems were removed.
Decontamination of all radiological contamination areas consistent with the NRC approved modified DGCLs.	Final Status Survey used MARRISM approved statistical method and all SU were below DGCLs.

5 WASTE MANAGEMENT

5.1 Handling of Waste

Prior to the start of remediation activities, the X-ray treatment unit was removed from the 1,000 kVp Treatment Room to facilitate the transfer of containerized waste from the basement level to the ground level. An electric hoist was installed in the ceiling access opening allowing waste to be transferred to the second floor. The hoist had a lift capacity of 4,000 pounds. When packaging the waste into the drums, care was taken to avoid exceeding the lift capacity of the hoist. The ground level area of Building 90 was designated and controlled as a RMA to be used for storage of drummed waste. Prior to this designation, the structural engineer confirmed the structural integrity of the location as feasible for use as an RMA. Barriers were constructed to secure the area and signs were posted stating "Radioactive Material Area Authorized Personnel Only".

All containerized waste was screened at the ACP. Upon radiological clearance, all waste was lifted through the ceiling of the Treatment Room to the ground level of Building 90. Waste was then stored in the RMA, in accordance with the waste management plan. (WMP), until transportation to a licensed treatment, storage, and disposal facility. All stored wastes were properly labeled in accordance with the WMP. The RMA was inspected to ensure the integrity of the drums.

5.2 Disposal of Waste

Appendix C contains the waste characterization forms, waste shipping manifests, and waste shipping log for all hazardous or regulated wastes generated for this project.

5.2.1 Disposal of X-ray Treatment Unit

At the direction of the USACE, Stone & Webster identified and evaluated disposal options for the X-ray treatment unit removed from the 1000 kvp Treatment Room. Information developed from operating manuals and General Electric (the manufacture of the device) indicated that the unit could be disposed at a non-RCRA facility.

5.2.2 Disposal of Radiological Waste

Drummed Class A waste (307 drums) was shipped directly to Envirocare by Franklin Environmental. Four drums of Class B radiological waste was shipped to GTS/Duratek, a licensed TSDF, for temporary storage. GTS/Druatek shipped the drums to Barnwell Waste Management Facility on October 31, 2002.

The following explains the determination of the classification of the pipe beneath SU005 as Class B Waste. Initially the pipe waste was determined to be Class B based on external surveys and assumptions for Bremstrahlung effect relative to Strontium 90-concentrations. The scale within the pipes was subsequently sampled to establish a more accurate estimate of the radioactive concentrations within the pipe. The sample data, assumed volume of material within the pipe and the actual pipe volume were used to determine the waste classification. Based on calculations performed by USACE, the

results indicated that the waste met the criteria for Class B waste disposal in accordance with 10 CFR 61.55.

5.2.3 Recycling of Lead Pipe

Recycling of lead tile from isotope room in High level Lab were removed as part of the D&D operations. Tiles were decontaminated on site, radiologically scanned and confirmed to not contain radiological materials above the DCGLs, and shipped off site to a local recycling center.

5.2.4 Disposal of ACM Waste

All ACM waste generated from this site was categorized as radiological waste. This waste stream was placed in drums and shipped with the other radiological waste directly to Envirocare.

6 SITE RESTORATION

Stone & Webster conducted site restoration activities after receiving approval of the Final Status Survey by the NRC and direction from the USACE to proceed. Restoration included:

- 1. Restore the excavated areas to within 6 inches of finish grade using sand.
- 2. Place 6 inches of 4000 pound per square inch (psi) concrete with wire mesh reinforcing.
- 3. Clean soil removed from the hallway (stored in a nearby mechanical room) will be reused to fill the excavated area in the hallway. Specifications have not been supplied for fill, concrete, or wire mesh.
- 4. Quality control testing will be limited to concrete testing. Additional testing such as fill gradation/proctor analysis or compaction testing are not planned or budgeted at this time.
- 5. Fill, wire mesh, and concrete products will be standard products readily available at local suppliers.
- 6. Place final leveling course suitable to accept VT flooring.

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Date: 10-19-00 Time: 1600

Preservative: Name

Tests required:

C-14, H-3 & Sr-90

Client: STONE & WEBSTER

Sample ID: DRUM OOZ (143)

Collected by: MARC KIANCO

Date: 10-19-00 Time: 1600

Preservative: (NHD3) Nitric Acid

Tests required:

C-14, H-3 & Sr-90

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Collected by: Marc Bianco

Date: 10-19-00 Time: 1600

Preservative: None

Tests required:

C-14: H-3 & Sr-90

Client: Stone & Webster

Sample ID: Drum 002 (343)

Collected by: MARC BIANCO

Date: 10-19-00 Time: 1600

Preservative: None

Tests required:

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APPENDIX A

SAMPLE CHAIN OF CUSTODY FORMS

AND

ANALYTICAL TESTING RESULTS

NOTICE

"RADIOACTIVE MATERIAL EXCEPTED PACKAGE / LIMITED QUANTITY OF MATERIAL"

CAUTION

RADIOACTIVE MATERIAL





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Client	•		Project Manager					Date	: '		. (Chain O	f Custo	dy Num	iber A A	101
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Sample I.D. No. and Description	Date	Time	Sample Type	Volume	Type	No.	Preservative	Condition on Receipt								<u> </u>
SAISS 308XX	11301	1500) Soil	1200	Glass	11	NA		X		\perp				11	, sap.
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Special Instructions ,					,				•	•	• •			-		
Possible Hazard Identification					Sample	Disnosa	1							<u> </u>		
Non-Hazard Flammable Skir	Initant -] Poison i	в. 🗵 Uni	(noun	.1		Client	Disposal By Lab	ŕ	Xan	hive For		3;	Months		
Turn Around Time Required	, man,	31 013011	QC Level				(Specify)	· La Dioposia Dy Lito	طنـــــ	Zi Kuo	1870 1 01		<u> </u>	3071070	·	
Normal Rush		:		ı. 🗆 m.		•	•				•		:			
1. Relinquished By			Date	Time	1. Rece	ived By						Date		17	Time	
Alla A Service)		01/63/01	1500	1			•	:		•	.] •		- 1		
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3. Relinquished By		· i	Date	Time	3. Recei	ived By						Date	:	1.7	Time	
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Comments		14	•						••		. :		100		:	
DISTRIBUTION: WHITE Stays with Sample; CANAF	(CM MICHA)	7-	Description of	ald Carre	 .				<u>.</u>	<u> </u>	 ;	<u> </u>	-	<u> </u>		
DISTRIBUTION: WHITE . Stays with Sample; CANAF	rr - Hetumed to	ulent With	т нөрог; РINK - Fi	ега Сору					•	٠,		•	:			

	IRVEY UNIT 18 (Counting Room, Wash Room & Corridor 15)
SOIL SAMPLE DESIGNATION	COLLECTION LOCATION DESCRIPTION
SA1SS312XX	Stainless steel/cast iron common trench approximately 12 ft east of emergency shower dra
SA1SS313XX	Stainless steel/cast iron common trench crossing corridor 15 ramp north side
SA1SS314XX	Stainless steel/cast iron common trench crossing confider 15 ramp south side
SA1SS315XX	Cast iron common trench piping trench beneath distillation sink area in closet
SA1SS316XD	Stainless steet/cast iron common french crossing corridor 15 ramp south side - Duplicate
31YXD	

OPORS

SOIL SAMPLE	
DESIGNATION	COLLECTION LOCATION DESCRIPTION
SA55S301XX	Stainless steel/cast iron common trench crossing comidor 45 north side
SA5SS302XX	Stainless steel/cast iron common trench crossing comdor 45 center
SA5SS303XX	Stainless steel/cast iron common trench crossing corridor 45 south side
SA5SS302XD	Steinless steet/cast iron common trench crossing corridor 45 center - Duplicate Sampl

	SOIL SAMPLE	UNIT 1A (High Level and Low Level Labs & Isotope Storage Area)
	DESIGNATION	COLLECTION LOCATION DESCRIPTION
-		
	SA1SS301XX	Stainless steel piping trench below high level lab sink
	SA15S302XX	Stainless steel piping trench under high level lab fume hood drain north end
	SA1S8303XX	Stainless steel pipting trench under high level lab furne hood drain south and
	SA15\$304XX	Stainless steel piping trench below low level leb sink northwest comer
	SA1SS305XX	Stainless steel piping trench below UST area
	SA1SS306XX	Steinless steel piping trench junction of low level sink and UST drain lines
	SA1S\$307XX	Stainless steel piping trench below low level lab sink northeast comer
	\$A1\$\$308XX	Stainless steel pipe trench beneath low level lab cabinet area
	SA15S309XX	Cast fron piping trench beneath smergency shower drain area
·	SA1SS310XX	Stainless steel/cast fron common trench approximately 4 ft east of emergency shower drain
	SA1SS311XX	Stainless steel/cast Iron common trench approximately 8 ft east of emergency shower dra
	SA15S301XD	Stainless steel piping trench below high level lab sink - Duplicate
	SA1SS309XD	Cast Iron piping french beneath emergency shower drain area - Duplicate
	SA1SS311XD	Stainless steel/cast iron common trench approximately 8 ft east of emergency shower dra



RADIOACTIVE MATERIAL

ACCOUNTABILITY NO.		OR [None Required
DESCRIPTION OF MATER	NAL		.
CONT	AMINAT	ION DATA	
BURFACE CONTAMINATI Bels-Gamma	on on mate	RIAL -8	100 cm2
Alpha	~//4		uuc/100 cm2
	DIATION	DATA	
BURFACE DOSE HATE	= 0	008	anem/hr
ESTIMA'	TED CUR	IE CONTE	VTTV
		:	millicuries
SPECI	AL INSTI	RUCTIONS	·
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ITEM NO. **CAUTION**

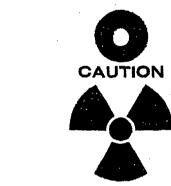
RADIOACTIVE MATERIALS

CONTAMINATION LEVEL 3 DPm/100 cm2
RADIATION LEVEL = 0.009 mR/len
DATE 12-2-00
R. C. TECH. CS
RESP. PERSON Stone & webster.
DESCRIPTION



RADIOACTIVE MATERIAL

ACCOUNTABILITY NO. OR NONE REQUIRED	- 1
	_
DESCRIPTION OF MATERIAL	=
CONTAMINATION DATA	=
SURFACE CONTAMINATION ON MATERIAL DOM	_
Beta-Gemma orde/100 or	m2
Alpha W//A Buchtoo e	m2
RADIATION DATA	=
SURFACE DOSE RATE	. 1
SURFACE DOSE RATE 0. 0/0 mrem	mr
ESTIMATED CURIE CONTENT	_
milicum	es
SPECIAL INSTRUCTIONS	=
REPRESENTATIVE CS A DATE	



RADIOACTIVE MATERIAL

ACCOUNTABILITY NO.		ORII	NONE REQUIRED
DESCRIPTION OF MATERIAL	_		
CONTA	MINATION	I DATA	
SURFACE CONTAMINATION		NH,	Day_
Beta-Gamma	7 47/0	1	and 100 out
Alpha	<u>~/4</u>		_ uuc/100 cm2
	IATION D	ATA	
SURFACE DOSE RATE	.009		overo/hr
ESTIMATE	D CURIE	CONTEN	Γ
	N/A.		milleuries
SPECIAL	INSTRU	CTIONS	
REPRESENTATIVE	1	DATE	7-00



RADIOACTIVE MATERIAL

1	ACCOUNTABILITY NO. OR NONE REQUIRED
:	description of material
5.7	CONTAMINATION DATA
	SURFACE CONTAMINATION ON MATERIAL
	Reta-Gamma great 100 cm2
	Alpha wuchton em2
.,	RADIATION DATA
ŀ	SURFACE DOSE RATE CALL O.01/ ntrenulhr
	ESTIMATED CURIE CONTENT
	militeuries
	SPECIAL INSTRUCTIONS
! I	
	REPRESENTATIVE C P C DATE 12->-00



STL St. Louis 13715 Rider Trail North Earth City, MO 63045

Tel 314 298 8566 Fax 314 298 8757 www.stl-inc.com

ANALYTICAL REPORT

PROJECT NO. VA

St. Albans

Lot #: F1A080114

Tim Taylor

Stone & Webster Engineering Co 245 Summer Street Boston, MA 02210

SEVERN TRENT LABORATORIES, INC.

Ron Martino Project Manager

February 5, 2001

Case Narrative LOT NUMBER: F1A080114

This report contains the analytical results for the 23 samples received under chain of custody by STL St. Louis on January 8, 2001. These samples are associated with your St. Albans project.

All applicable quality control procedures met method-specified acceptance criteria.

This report is incomplete without the case narrative. All results are based upon sample as received, wet weight, unless noted otherwise.

Observations/Nonconformances

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

There were no anomalies with this analysis.

METHODS SUMMARY

F1A080114

PARAMETER

ANALYTICAL

PREPARATION

METHOD

METHOD

STRONTIUM 90 Sr90-Y90 cal

DOE 7500-SR MOD

References:

DOE

"DOE METHODS FOR EVALUATING ENVIRONMENTAL AND WASTE MANAGEMENT SAMPLES" OCTOBER 1994 US DEPARTMENT OF ENERGY

SAMPLE SUMMARY

F1A080114

			SAMPLED	SAMP
WO #	SAMPLE#	CLIENT SAMPLE ID	DATE	TIME
DTCW5	001	SA5SS301XX	01/03/01	
DTCW8	002	SASSS302XX	01/03/01	
DTCW9	003 -	SA5SS303XX	01/03/01	15:00
DTCXA	004	SA5SS302XD	01/03/01	15:00
DTCXC	005	SAISS312XX	01/03/01	15:00
DTCXD	006	SA1SS313XX	01/03/01	15:00
DTCXE	. 007	SA1SS314XX	. 01/03/01	15:00
DTCXF	800	SA1SS315XX	01/03/01	15:00
DTCXG	009	SA1SS314XD	01/03/01	15:00
DTCXH	010	SA1SS301XX	01/03/01	15:00
DTCXJ	011	SA1SS302XX	01/03/01	15:00
DTCXK	012	SA1SS303XX	01/03/01	15:00
DTCXL	013	SA1SS304XX	01/03/01	15:00
DTCXM	014	SA1SS305XX	01/03/01	
DTCXN	015	SA1SS306XX	01/03/01	
DTCXP	016	SAISS307XX	01/03/01	
DTCXQ	017	SA1SS308XX	01/03/01	
DTCXR	018	SA1SS309XX	01/03/01	
_ DTCXV	019	SA1SS310XX	01/03/01	
DTCXW	020	SA1SS311XX	01/03/01	
DTCXO	021	SA1SS301XD	01/03/01	
DTCX1	022	SA1SS309XD	01/03/01	
DTCX2	023	SA1SS311XD	01/03/01	
	453	V1 145777 4 4 1152	01/03/01	,,,,,

NOTE (S):

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

Client Sample ID: SA5SS301XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-001

Work Order: Matrix:

DTCW5 SOLID

Date Collected: 01/03/01 1500

Date Received:

Parameter	Result	Qual	Total Uncert. (2 o+/~)	MDC_	Prep Date	Analysis Date	Batch #	Yld &
SR-90 BY GFPC	DOE 7500-SR MOD		•	1/g		SR MOD		
Strontium 90	-0.02	ט	0.35	0.62	01/23/0	1 01/31/01	1023234	100

Client Sample ID: SA5SS302XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-002

Work Order: DTCW8 Matrix:

SOLID

Date Collected: 01/03/01

1500

Date Received:

01/08/01

Parameter	Result	Qual	Tótal Uncert. (2 ₀ +/-)	MDC	Prep Date	Analysis Date	Batch #	Yld 4
SR-90 BY GFPC	DOE 7500-SR MOD	,	ρÇ	i/g	7500-	SR MOD		
Strontium -90	0.04	U	0.42	0.72	01/23/0	01/31/01	1023234	100

Client Sample ID: SA5SS303XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-003

Work Order: DTCW9

Matrix: SOLID

Date Collected: 01/03/01 1500 Date Received: 01/08/01 0910

Date Received: 01/08/01 0

Parameter	Result	Qual	Total Uncert. (2 g+/-)	мос	Prep Date	Analysis Date	Batch #	Yld %
SR-90 BY GFPC	DOE 7500-SR MOD		pC	i/g	7500-	SR MOD		
Strontium 90	0.47	U	0.40	0.65	01/23/0	01/31/01 1	023234	100

Client Sample ID: SA5SS302XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-004

Work Order:

DTCXA

Matrix:

SOLID

Date Collected: 01/03/01 1500

Date Received:

Parameter	Result	Qual.	Total Uncert. (2 g+/-) .	MDC	Prep Date	Analysis Date	Batch #	Yld 4
SR-90 BY GFPC	DOE 7500-SR MOD		pC	i/g	7500-	SR MOD		
Strontium 90	-0.07	U	0.31	0.54	01/23/0	1 01/31/01	1023234	100

Client Sample ID: SA1SS312XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-005

Work Order:

DTCXC

Matrix:

Parameter

Strontium 90

SOLID

Date Collected: 01/03/01 1500 Date Received: 01/08/01 0910

Total Uncert. Prep Analysis Result Qual (2 0+/-) Date Date Batch # Yld & MDC SR-90 BY GFPC DOE 7500-SR MOD pCi/g 7500-SR MOD 01/23/01 01/31/01 1023234 0.47 0.59 1,27 100

Client Sample ID: SA1SS313XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-006

Work Order:

DTCXD

Matrix:

SOLID

Date Collected: 01/03/01 1500

Date Received:

Parameter	Result	Qual ·	Total Uncert. (2 gt/-)	мос	Prep Date	Analysis Date	Batch #	Yld 4
SR-90 BY GFPC	DOE 7500-SR MOD		p	Ci/g	7500-9	R MOD		
Strontium 90	0.33	IJ	0.36	0.60	01/23/01	01/31/01	1023234	100

Client Sample ID: SA1SS314XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID: F1A080114-007

Work Order: Matrix:

DTCXE SOLID Date Collected: 01/03/01 1500 Date Received:

Parameter	Result	Qual	Total Uncert. (2 g+/-)	жес	Prep Date	Analysis Date	Batch #	YId i
SR-90 BY GFPC	DOE 7500-SR MOD	•		pCi/g	7500-	R MOD		
Strontium 90	2.14		0.59	0.57	01/23/0	1 01/31/01	1023234	100

Client Sample ID: SA1SS315XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-008

Work Order: DTCXF Matrix:

Parameter

SOLID

Date Collected: 01/03/01 1500

Date Received:

Prop

Date

7500-SR MOD

01/08/01 0910

		Total		
		Uncert.		
Result	Qual	(2 0+/-)	MDC	

0.41

pCi/g

Analysis Date Batch #

SR-90 BY GFPC DOE 7500-SR MOD Strontium 90

0.05

0.71

01/23/01 01/31/01 1023234

100

As are incomplete without the case narrative.

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

Result is less than the sample detection limit.

Client Sample ID: SA1SS314XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID: F1A080114-009

Work Order: DTCXG Matrix: SOLID Date Collected: 01/03/01 1500 Date Received: 01/08/01 0910

Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 gt/-)	MDC	Frep Date	Analysis Date Batch #	Yld %
SR-90 BY GFPC	DOE 7500-SR MOD		P	Ci/g	7500-	SR MOD	
Strontium 90	6.6		1.4	0.6	01/23/6	01/31/01 1023234	100

Client Sample ID: SA1SS301XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-010

Work Order:

DTCXH

Matrix:

SOLID

Date Collected: 01/03/01 1500

Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	мос	Prep Date	Analysis Date i	Batch #	Yld \$
BR-90 BY GFPC	DOE 7500-SR MO	D	pCi	./g	7500-	SR MOD		
Strontium 90	1.07		0.47	0.66	01/23/0	01/31/01 1	023234	100

Client Sample ID: SA1SS302XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-011

Work Order: Matrix:

DTCXJ SOLID Date Collected: 01/03/01 1500

Date Received:

Parameter	Result	Qual	Total Uncert. (2 gt/-)	МОС	Prep Date	Analysis Date	Batch #	Yld %
SR-90 BY GFPC	DOE 7500-SR MOD		pC	i/g	7500-	ER MOD		•
Strontium 90	0.20	U	0.39	0.66	01/23/0	1 01/31/01	1023234	97

Client Sample ID: SA1SS303XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID: F1A080114-012

Work Order:

DTCXK

Matrix:

SOLID

Date Collected: 01/03/01 1500

Date Received: 01/08/01 0910

Total

pCi/g

Prep Analysis

Uncert. (2 0+/-)

MOC

Date Date

Batch # Yld 4

Result Parameter

DOE 7500-SR MOD SR-90 BY GFPC

Qual

7500-SR MOD

Strontium 90

1.84

0.56

0.62

01/23/01 01/31/01 1023234

100

ita are incomplete without the case narrative. MDC is determined by instrument performance only. Bold results are greater than the MDC

Client Sample ID: SA1SS303XX DUP

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-012X

Work Order: Matrix:

DTCXK

SOLID

Date Collected: 01/03/01 1500 Date Received: 01/08/01 0910

Parameter	Result	Qual .	Total Uncert. (2 o+/-)	WDC	Prep Date	Analysis Date Ba	tch #	Yld 4
SR-90 BY GFPC	DOE 7500-SR MOD		I	Ci/g	7500-	SR MOD		•
Strontium 90	1.76		0.54	0.61	01/23/	01 01/31/01 102	23234	100

Client Sample ID: SA1SS304XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-013

Work Order:

DTCXL

Matrix:

SOLID

Date Collected: 01/03/01

1500

Date Received:

01/08/01

.Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep . Date	Analysis Date	Batch #	Yld &
SR-90 BY GFFC	DOE 7500-SR MOD		Y	ci/g	7500-8	R MOD		
Strontium 90	2.34		0.60	0.51	01/24/01	02/01/01	1024214	89

Client Sample ID: SA1SS305XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-014

Work Order:

DTCXM

Matrix:

SOLID

Date Collected: 01/03/01

1500

Date Received:

01/08/01

0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld &
SR-90 BY GFPC	DOE 7500-SR MOD		pCi	i/g	7500-s	R MOD		
Strontium 90	0.98		0.42	0.57	01/24/0	02/01/01	1024214	80

Client Sample ID: SA1SS306XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-015

Work Order: Matrix:

DTCXN SOLID Date Collected: 01/03/01 1500

Date Received:

rotal	
moert.	

Parameter	Result	Qual	Uncert. (2 c+/-)	мос	Prep Date	Analysis Date I	atch #	xld &
SR-90 BY GFPC	DOE 7500-SR MOD		pq	i/g	7500-s	R MOD		
Strontium 90	0.68	•	0.39	0.59	01/24/0	L 02/01/01 1	024214	79

Client Sample ID: SA1SS307XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-016

Work Order:

DTCXP

Matrix:

Parameter

Strontium 90

SOLID

Result

0.72

Date Collected: 01/03/01 1500

7500-SR MOD

Date Received:

01/08/01 0910

Total

Uncert. (2 0+/-)

Prep MDC

Analysis Date

Batch # Yld %

SR-90 BY GFFC DOE 7500-SR MOD

Qual

0.42

0.64

pCi/g

01/24/01 02/01/01 1024214

79

Client Sample ID: SA1SS308XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-017

Work Order: DTCXQ Matrix:

SOLID

Date Collected: 01/03/01 1500

Date Received:

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Data	Analysis Date I	Batch #	Yld \$
SR-90 BY GFPC I	OOE 7500-SR MO)	pC	i/g	7500-	SR MOD		•
Strontium 90	1.59		0.49	0.47	01/24/0	01 02/01/01 1	024214	90

Client Sample ID: SA1SS309XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-018

Work Order: Matrix:

DTCXR

SOLID

Date Collected: 01/03/01 1500

Date Received:

Parameter	Result	Qual	Total Uncert. (2 gt/-)	мос	Prep Date	Analysis Date I	Satch #	Yld &
SR-90 BY GFFC DO	e 7500-sr moi)	рC	i/g	7500-	SR MOD		
Strontium 90	6.81		0.89	0.60	01/24/	02/02/01 1	024214	88

Client Sample ID: SA1SS310XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-019

Work Order: Matrix:

DTCXV SOLID Date Collected: 01/03/01 1500

Date Received:

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Data l	Batch #	Yld 4
SR-90 BY GFPC	DOE 7500-SR MOD		р	Ci/g	7500-	SR MOD		
Strontium 90	4.23		0.95	0.56	01/24/	01 02/02/01 1	.024214	89

Client Sample ID: SA1SS311XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-020

Work Order: Matrix:

DTCXW SOLID Date Collected: 01/03/01 1500

Date Received:

Parameter	Result	Qual	Total Uncert. (2 o+/-)	мос	Prep Data	Analysis Date	Batch #	Yld &
SR-90 BY GFPC	DOE 7500-SR MOD		pt	Ci/g	7500-SI	R MOD	•	
Strontium 90	4.6		1.0	0.6	01/24/01	02/01/01	1024214	74

Client Sample ID: SA1SS301XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-021

Work Order: DTCX0 Matrix:

SOLID

Date Collected: 01/03/01 Date Received:

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC .	Prep Date	Analysis Date	Batch #	Yld *
SR-90 BY GFPC	DOE 7500-SR MOD		pCi/	g	7500-	SR MOD	······································	
Strontium 90	0.05	Ū	0.39	0.67	01/24/0	1 02/01/01	1024214	71

Client Sample ID: SA1SS309XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-022

Work Order: Matrix:

DTCX1

SOLID

Date Collected: 01/03/01 1500

Date Received:

otal			
noert.	Preo	Analysis	

Parameter	Reault	' Qual	Uncert.	MDC	Prep Date	Analysis Date I	Batch #	Yld 4
SR-90 BY GFPC	DOE 7500-SR MOD		pC	i/g	7500-	SR MOD		
Strontium 90	3.27		0.81	0.63	01/24/0	1 02/01/01 1	024214	79
								



Client Sample ID: SA1SS311XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-023

Work Order: Matrix:

DTCX2 SOLID Date Collected: 01/03/01 1500

Date Received:

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date I	Batch #	Yld %
SR-90 BY GFPC	DOE 7500-8R MOD		i.Jq	i/g	7500-	sr mod		
Strontium 90	1.03		0.40	0.52	01/24/0	1 02/01/01 1	024214	86

METHOD BLANK REPORT

Quanterra, Inc. - Radiochemistry

Client Lot ID:

F1A080114

Matrix:

SOLID

			Total		Lab Sample ID				
Parameter	Result	Qual	Uncert. (2 g+/-)	мос	Prep Date	Analysis Dats	Batch #	Ald #	
SR-90 BY GFPC	DOE 7500-SR MOD		pCi/g	7500-SR MOD		F1A2	30000-234	В	
Strontium 90	-0.05	· ti	0.35	0.61	01/23/01	01/31/01	1023234	100	
SR-90 BY GFPC	DOE 7500-SR MOD		pCi/g	7500-SR MOD		F1A2	40000-214	B	
Strontium 90	-0.11	ប	0.43	0.75	01/24/01	02/02/01	1024214	88	

DUPLICATE EVALUATION REPORT

Quanterra, Inc. - Radiochemistry

ent Lot ID: Order #: Matrix:

F1A080114 DTAC SOLID

Date Sampled: Date Received: 01/05/01

01/02/00

			Total Uncert.		DUPLICATE	Total Uncert.		QC Bample ID	
Parameter		SAMPLE Result	(20+/-)	9 Y1d	Result	(2 o+/-)	\$ Yld	Precisi	lon
SR-90 BY GFPC	DOE	7500-SR p	Ci/g	7500-SR	MOD		· F	1A050206-0	07
Strontium 90		-0.05 U Batch #:	0.34 1024214	87 (Sample)	0.16 U 1024214 (0.34 Duplicate)	90	367	%RPD
SR-90 BY GFPC	DOE	7500-SR p(Ci/g	7500-SR	MOD		F	1A080114-0	12
Strontium 90	-	1.84 Batch #:	0.56 1023234	100 (Sample)	1.76 1023234 (0.54 Duplicate)	100	4	*RPD

Data are incomplete without the case narrative. Calculations are performed before rounding to avoid round-off error in calculated results

Laboratory Control Sample Report



Client Lot ID:

F1A080114

Matrix:

SOLID

				Total			Lab £	Sample ID
'arameter	٠	, Spike Amount	Result	Uncert. (2 g+/-)	MDC	* Yld	* Rec	QC Control Limits
SR-90 BY GFP	C DOE	7500-SR MOD	pCi/g		7500-SR MOD		Fla23	0000-234C
Strontium 90		9.83	5.8	1.2	0.6	100	59	49 - 126
		Batch #:	1023234		AnalysisDate	01/3	1/01	•
SR-90 BY GFP	C DOE	7500-SR MOD	pCi/g	· · · · · · · · · · · · · · · · · · ·	7500-SR MOD		F1A24	0000-214C
Strontium 90		9.83	11.4	2.4	0.8	76	116	49 - 126
		Batch #:	1024214		AnalysisDate	02/0	2/01	



STL St. Louis 13715 Rider Trail North Earth City, MO 63045

Tel 314 298 8566 Fax 314 298 8757 www.stHnc.com

ANALYTICAL REPORT

PROJECT NO. VA

St. Albans

Lot #: F0L220154

Tim Taylor

Stone & Webster Engineering Co 245 Summer Street Boston, MA 02210

SEVERN TRENT LABORATORIES, INC.

Ron Martino Project Manager

January 18, 2001

STL St. Louis is a part of Severn Trent Laboratories, Inc.

Case Narrative LOT NUMBER: F0L220154

This report contains the analytical results for the three samples received under chain of custody by STL St. Louis on December 22, 2000. These samples are associated with your St. Albans project.

All applicable quality control procedures met method-specified acceptance criteria.

Observations/Nonconformances

There were no anomalies with this analysis.

METHODS SUMMARY

F0L220154

PARAMETER ANALYTICAL PREPARATION METHOD METHOD

STRONTIUM 90 Sr90-Y90 cal

DOE 7500-SR MOD

References:

DOE

"DOE METHODS FOR EVALUATING ENVIRONMENTAL AND WASTE MANAGEMENT SAMPLES" OCTOBER 1994 US DEPARTMENT OF ENERGY

SAMPLE SUMMARY

F0L220154

WO # 5	SAMPLE#	CLIENT SAMPLE ID	DATE	TIME
DRXHJ DRXHL DRXHV	001 002 003	CAST 001 (DRAIN IN LAB) CAST 002 (CLEANOUT BEFORE COOR.15) CAST 003 (MIDWAY COORIDOR 45)	12/21/00 12/21/00 12/21/00	16:0¢

NOTE (S):

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

Client Sample ID: CAST 001 (DRAIN IN LAB)

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F0L220154-001

Work Order:

DRXHJ

Matrix:

SOLID

Date Collected: 12/21/00 1600

Date Received: 12/22/00 1130

Parameter	Result	Qual	Total Uncert. (2 c+/-)	MDC	•	inalysis Date	Batch #	Yla %
SR-90 BY GFFC	DOE 7500-SR MOD		pCi/g	, .	7500-SR	MOD		
Strontium 90	72000	+	14000	20	01/12/01	01/16/01	1012333	75

Data are incomplete without the case narrative.

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

For informational purposes only. The detection limit does not follow significant figures SOP.

Client Sample ID: CAST 001 (DRAIN IN LAB) DUP

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F0L220154-001X

Work Order:

DRXHJ

Matrix:

SOLID

Date Collected: 12/21/00 1600

Date Received:

12/22/00 1130

Parameter	Result	Qual	Total Uncert. (2 o+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %	* . *
SR-90 BY GFPC D	OE 7500-SR MOI)	Og	i/g	7500-	SR MOD			_
Strontium 90	94000	+	18000	30	01/12/0	01/16/01 1	.012333	69	

ta are incomplete without the case narrative.

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

For informational purposes only. The detection limit does not follow significant figures SOP.

Client Sample ID: CAST 002 (CLEANOUT BEFORE COOR.15)

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F0L220154-002

Work Order: Matrix:

DRXHL SOLID Date Collected: 12/21/00

1600

Date Received:

12/22/00

Total Uncert.

Prep Date

Analysis Date

Batch #

Parameter

Result

Qual

(2 0+/-)

MDC

7500-SR MOD

Yld %

SR-90 BY GFPC DOE 7500-SR MOD Strontium 90

125000

24000

50

pCi/g

01/12/01 01/16/01 1012333

72

Data are incomplete without the case narrative. MDC is determined by instrument performance only.

Bold results are greater than the MDC

For informational purposes only. The detection limit does not follow significant figures SOP.

Client Sample ID: CAST 003 (MIDWAY COORIDOR 45)

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F0L220154-003

Work Order: Matrix:

DRXHV

SOLID

Date Collected: 12/21/00 1600

Date Received:

12/22/00 1130 .

Parameter	Reault	Qual.	Total Uncert. {2 o+/-}	MDC	Prep Date	Analysis Date	Batch #	Yld &
SR-90 BY GFPC	DOE 7500-SR MOD		pQ	i/g	7500-	SR MOD		
Strontium 90	269		53	1	01/12/0	1 01/16/01	1012333	96

METHOD BLANK REPORT

Quanterra, Inc. - Radiochemistry

Client Lot ID:

F0L220154

Matrix:

SOLID

•			Total			Lab Sample ID				
Parameter	Result	Qual	Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld &		
SR-90 BY GFPC	DOE 7500-SR MOD		pCi/g	7500-SR MOD		F1A120000-333B				
Strontium 90	0.04	U	0.25	0.44	01/12/01	01/16/01	1012333	90		

DUPLICATE EVALUATION REPORT

Quanterra, Inc. - Radiochemistry

ent Lot ID:

F0L220154

Work Order #: Matrix: DRXH SOLID Date Sampled:

12/21/00

Date Received:

12/22/00

	•	Total			· Total		QC Sample ID	•
Parameter	SAMPLE Result	Uncert. (2 o +/-)	a alg	DUPLICATE Result	Uncert. (2 a +/-)	% Yld	Precision	
SR-90 BY GFPC	DOE 7500-SR	pCi/g	7500-SR	MOD		F)L220154-001	
Strontium 90	72000 Batch	+ 14000	75 (Sample)	94080 +	18000	69	27 %RP1	

Laboratory Control Sample Report

Quanterra, Inc. - Radiochemistry

Client Lot ID:

FOL220154

Matrix:

SOLID

			Total		Lab Sample ID					
arameter	Spike Amount	Result	Uncert. (2 g+/-)	MDC	% Yld	% Rec	QC Control Limits			
SR-90 BY GFPC	DOE 7500-SR MOD	pCi/g	7	500-SR MOD		F1A12	0000-333C			
Strontium 90	9.59	8.5	1.7	0.4	93	89	49 - 126			
•	Batch #:	1012333		AnalysisDate	01/16	5/01				

PSL20300 Ţе

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY

STL St. Louis

Run Date: 1/08/01 Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-001

PROJECT #: VA WORK ORDER: DTCW5

REPORT TO: Tim Taylor RECEIVING DATE: 1/08/01

P.O. NUMBER: SAMPLING DATE: 1/03/01

ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01 SITE: St. Albans

AMOUNT REC'D: 120G

STORAGE LOC: RAD PRIORITY: 28 LOT COMMENTS:

SAMPLING TIME: 15:00 MATRIX: SOLID

RECEIVING TIME: 9:10 SAMPLE ID: SA5SS301XX

QC PACKAGE: CLP SDG# : SAMPLE COMMENTS:

.00 Ending Depth: Beginning Depth: -00

> EXTRACTION WRK REQUEST ANALYSIS **** ANALYSIS **** LOC DATE EXP DATE EXP DATE

SR-90 BY GFPC DOE 7500-SR MOD 06 1/08/01 0/00/00 7/02/01

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCW5-1-AA Protocol: A QC Program: STANDARD TEST SET

SEVERN TRENT LABORATORIES, INC Run Date: 1/08/01 CLIENT ANALYSIS SUMMARY

STL St. Louis

Time: 9:02:07 User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino

LAB ID: F-1A080114-002

PROJECT #: VA

WORK ORDER: DTCW8

REPORT TO:

RECEIVING DATE: 1/08/01

P.O. NUMBER: SITE: St. Albans SAMPLING DATE: 1/03/01

AMOUNT REC"D: 120G STORAGE LOC: RAD

ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01

LOT COMMENTS:

PRIORITY: 28

MATRIX: SOLID

SAMPLING TIME: 15:00

SAMPLE ID: SA5SS302XX

RECEIVING TIME:

9:10

QC PACKAGE: CLP SAMPLE COMMENTS: SDG# :

Beginning Depth: .00 Ending Depth: .00

Tim Taylor

WRK REQUEST EXTRACTION ANALYSIS **** ANALYSIS ***** LOC DATE EXP DATE EXP DATE

SR-90 BY GFPC DOE 7500-SR MOD 06 1/08/01 0/00/00 7/02/01 PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCW8-1-AA Protocol: A QC Program: STANDARD TEST SET

PSL20300

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY STL St. Louis

Run Date: 1/08/01 Time: 9:02:07

User Id : CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-003

PROJECT #: VA WORK ORDER: DTCW9

Tim Taylor RECEIVING DATE: 1/08/01 REPORT TO:

SAMPLING DATE: 1/03/01 P.O. NUMBER: ANALYTICAL DUE DATE: 2/05/01N SITE: St. Albans

REPORT DUE DATE: 2/06/01 AMOUNT RECTD: 120G

PRIORITY: 28 STORAGE LOC: RAD

SAMPLING TIME: LOT COMMENTS: 15:00 RECEIVING TIME: 9:10

MATRIX: SOLID SAMPLE ID: SA5SS303XX

SDG# : QC PACKAGE: CLP SAMPLE COMMENTS:

Beginning Depth: .00 Ending Depth: -00

. . .

EXTRACTION WRK REQUEST ANALYSIS ***** RIZYJANA ***** LOC DATE EXP DATE EXP DATE

SR-90 BY GFPC DOE 7500-SR MOD 1/08/01 0/00/00 06 7/02/01

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCW9-1-AA Protocol: A QC Program: STANDARD TEST SET

SAMPLE COMMENTS:

SEVERN TRENT LABORATORIES, INC Run Date: 1/08/01 CLIENT ANALYSIS SUMMARY

STL St. Louis

Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-004

WORK ORDER: DTCXA PROJECT #: VA

RECEIVING DATE: 1/08/01 REPORT TO: Tim Taylor

SAMPLING DATE: 1/03/01 P.O. NUMBER: ANALYTICAL DUE DATE: 2/05/01N SITE: St. Albans

REPORT DUE DATE: 2/06/01 AMOUNT REC'D: 120G

PRIORITY: 28 STORAGE LOC: RAD

SAMPLING TIME: 15:00 LOT COMMENTS:

RECEIVING TIME: 9:10 MATRIX: SOLID

SAMPLE ID: SA5SS302XD ✓ SDG# : QC PACKAGE: CLP

Beginning Depth: .00 Ending Depth: .00

REQUEST WRK EXTRACTION ANALYSIS **** ANALYSIS **** LOC DATE EXP DATE EXP DATE

SR-90 BY GFPC DOE 7500-SR MOD 06 1/08/01 0/00/00 7/02/01

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXA-1-AA Protocol: A QC Program: STANDARD TEST SET

PST-20300

QC PACKAGE: CLP

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY

STL St. Louis

Rum Date: 1/08/01

Time: 9:02:07

User Id.: CLARKEJ

OUOTE/SAR #: 38562 CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION

LAB ID: F-1A080114-005 PROJECT MANAGER: Ron Martino

WORK ORDER: DTCXC PROJECT #: VA

RECEIVING DATE: 1/08/01 Tim Taylor REPORT TO:

SAMPLING DATE: 1/03/01 P.O. NUMBER: ANALYTICAL DUE DATE: 2/05/01N SITE: St. Albans

AMOUNT REC"D: 120G REPORT DUE DATE: 2/06/01

PRIORITY: 28 STORAGE LOC: RAD

SAMPLING TIME: 15:00 LOT COMMENTS:

RECEIVING TIME: 9:10

SDG# : '

MATRIX: SOLID SAMPLE ID: SAISS312XX

SAMPLE COMMENTS:

Beginning Depth: .00 Ending Depth:

WRK REQUEST . EXTRACTION ANALYSIS EXP DATE EXP DATE **** ANALYSIS **** LOC DATE

.00

1/08/01 0/00/00 7/02/01 SR-90 BY GFPC DOE 7500-SR MOD 06

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021 (A-HL-ZP-01) DTCXC-1-AA Protocol: A QC Program: STANDARD TEST SET

SAMPLE COMMENTS:

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY

STL St. Louis

Run Date: 1/08/01

Time: 9:02:07 User Id.: CLARKEJ



CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-006

WORK ORDER: DTCXD PROJECT #: VA

REPORT TO: Tim Taylor RECEIVING DATE: 1/08/01

SAMPLING DATE: 1/03/01 P.O. NUMBER:

ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01 SITE: St. Albans

AMOUNT REC"D: 120G

PRIORITY: 28 STORAGE LOC: RAD

LOT COMMENTS: SAMPLING TIME: 15:00

MATRIX: SOLID RECEIVING TIME: 9:10 SAMPLE ID: SA1SS313XX

QC PACKAGE: CLP SDG# :

Beginning Depth: .00 Ending Depth: .00

WRK REQUEST EXTRACTION ANALYSIS ***** ANALYSIS ***** LOC DATE EXP DATE EXP DATE

SR-90 BY GFPC DOE 7500-SR MOD 06 1/08/01 0/00/00 7/02/01

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXD-1-AA Protocol: A QC Program: STANDARD TEST SET

PSL20300 ^`qe 1

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY STL St. Louis

Run Date: 1/08/01 Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

LAB ID: F-1A080114-007

0/00/00

7/02/01

SDG# :

PROJECT #: VA WORK ORDER: DTCXE

REPORT TO: Tim Taylor RECEIVING DATE: 1/08/01

SAMPLING DATE: 1/03/01 P.O. NUMBER: SITE: St. Albans

ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01 AMOUNT REC*D: 120G

STORAGE LOC: RAD PRIORITY: 28

LOT COMMENTS: SAMPLING TIME: 15:00

MATRIX: SOLID RECEIVING TIME: 9:10

SAMPLE ID: SAISS314XX

QC PACKAGE: CLP SAMPLE COMMENTS:

PROJECT MANAGER: Ron Martino

Beginning Depth: .00 Ending Depth: .00

> WRK REQUEST EXTRACTION ANALYSIS ***** ANALYSIS ***** TOC DATE EXP DATE EXP DATE

SR-90 BY GPPC DOE 7500-SR MOD 1/08/01 06 PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXE-1-AA Protocol: A QC Program: STANDARD TEST SET

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY

STL St. Louis

Rum Date: 1/08/01

Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

LAB ID: F-1A080114-008

PROJECT MANAGER: Ron Martino WORK ORDER: DTCXF PROJECT #: VA

Tim Taylor RECEIVING DATE: 1/08/01 REPORT TO: SAMPLING DATE: 1/03/01 P.O. NUMBER:

ANALYTICAL DUE DATE: 2/05/01N

REPORT DUE DATE: 2/06/01 AMOUNT REC"D: 120G

PRIORITY: 28

SAMPLING TIME: 15:00

RECEIVING TIME: 9:10

SAMPLE ID: SA1SS315XX SDG# :

QC PACKAGE: CLP

SITE: St. Albans

STORAGE LOC: RAD

LOT COMMENTS:

MATRIX: SOLID

SAMPLE COMMENTS:

Beginning Depth:

.00 Ending Depth:

.00

WRK REQUEST EXTRACTION ANALYSIS ***** ANALYSIS ***** FOC DATE EXP DATE EXP DATE

1/08/01 SR-90 BY GFPC DOE 7500-SR MOD 06 0/00/00 7/02/01

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXF-1-AA Protocol: A QC Program: STANDARD TEST SET

PSL20300

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY

STL St. Louis

Run Date: 1/08/01

Time: 9:02:07

User Id.: CLARKEJ

378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

LAB ID: F-1A080114-009 PROJECT MANAGER: Ron Martino

WORK ORDER: DTCXG PROJECT #: VA

RECEIVING DATE: 1/08/01 Tim Taylor REPORT TO: SAMPLING DATE: 1/03/01

P.O. NUMBER: SITE: St. Albans

ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01 AMOUNT REC"D: 120G

PRIORITY: 28 STORAGE LOC: RAD

SAMPLING TIME: 15:00 LOT COMMENTS:

RECEIVING TIME: 9:10 MATRIX: SOLID

SAMPLE ID: SA1\$\$314XD

QC PACKAGE: CLP SAMPLE COMMENTS:

Beginning Depth: .00 Ending Depth: .00

> WRK REQUEST EXTRACTION ANALYSIS **** ANALYSIS **** LOC DATE EXP DATE EXP DATE

SDG# :

1/08/01 0/00/00 7/02/01 SR-90 BY GFPC DOE 7500-SR MOD 06

PREP. RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCKG-1-AA Protocol: A QC Program: STANDARD TEST SET

SAMPLE COMMENTS:

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY

Run Date: 1/08/01 Time: 9:02:07

STL St. Louis

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

LAB ID: F-1A080114-010 PROJECT MANAGER: Ron Martino

PROJECT #: VA WORK ORDER: DTCXH

Tim Taylor RECEIVING DATE: 1/08/01 REPORT TO:

SAMPLING DATE: 1/03/01 P.O. NUMBER: ANALYTICAL DUE DATE: 2/05/01N SITE: St. Albans

REPORT DUE DATE: 2/06/01 AMOUNT REC"D: 120G

PRIORITY: 28 STORAGE LOC: RAD

SAMPLING TIME: LOT COMMENTS: 15:00

RECEIVING TIME: MATRIX: SOLID 9:10

SAMPLE ID: SAISS301XX

QC PACKAGE: CLP SDG# :

Beginning Depth: .00 Ending Depth: -00

WRK REQUEST EXTRACTION ANALYSIS ***** ANALYSIS ***** LOC DATE EXP DATE EXP DATE

SR-90 BY GFPC DOE 7500-SR MOD 1/08/01 0/00/00 06 7/02/01

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXH-1-AA Protocol: A QC Program: STANDARD TEST SET

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY STL St. Louis

Run Date: 1/08/01

Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

LAB ID: F-1A080114-011 PROJECT MANAGER: Ron Martino

WORK ORDER: DTCXJ PROJECT #: VA

RECEIVING DATE: 1/08/01 Tim Taylor REPORT TO:

SAMPLING DATE: 1/03/01 P.O. NUMBER: ANALYTICAL DUB DATE: 2/05/01N SITE: St. Albans

REPORT DUE DATE: 2/06/01 AMOUNT REC"D: 120G

PRIORITY: 28 STORAGE LOC: RAD

SAMPLING TIME: 15:00 LOT COMMENTS:

RECEIVING TIME: 9:10 MATRIX: SOLID

SAMPLE ID: SAISS302XX

QC PACKAGE: CLP SAMPLE COMMENTS:

.00 Ending Depth: .00 Beginning Depth:

> WRK request EXTRACTION ANALYSIS **** ANALYSIS **** LOC DATE EXP DATE EXP DATE

SDG# :

1/08/01 0/00/00 7/02/01 SR-90 BY GFPC DOE 7500-SR MOD 06

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXJ-1-AA Protocol: A QC Program: STANDARD TEST SET

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY STL St. Louis

Run Date: 1/08/01

Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-012

WORK ORDER: DTCXK PROJECT #: VA

REPORT TO: Tim Taylor RECEIVING DATE: 1/08/01

SAMPLING DATE: 1/03/01 P.O. NUMBER: ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01 SITE: St. Albans

AMOUNT REC"D: 120G

PRIORITY: 28 STORAGE LOC: RAD

LOT COMMENTS: SAMPLING TIME: 15:00

RECEIVING TIME: MATRIX: SOLID 9:10

SAMPLE ID: SA1SS303XX

QC PACKAGE: CLP SAMPLE COMMENTS:

Beginning Depth: .00 Ending Depth: .00

> WRK REQUEST EXTRACTION **** ANALYSIS **** LOC DATE EXP DATE EXP DATE

SDG# :

1/08/01 0/00/00 7/02/01 SR-90 BY GFPC DOE 7500-SR MOD 06

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021 (A-HL-ZP-01) DTCKK-1-AA Protocol: A QC Program: STANDARD TEST SET `ge 1

QC PACKAGE: CLP

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY

STL St. Louis

Run Date: 1/08/01

Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-013

PROJECT #: VA WORK ORDER: DTCXL

Tim Taylor REPORT TO: RECEIVING DATE: 1/08/01

P.O. NUMBER: SAMPLING DATE: 1/03/01 SITE: St. Albans ANALYTICAL DUE DATE: 2/05/01N

AMOUNT REC"D: 120G REPORT DUE DATE: 2/06/01

STORAGE LOC: RAD PRIORITY: 28

LOT COMMENTS: SAMPLING TIME: 15:00

MATRIX: SOLID RECEIVING TIME:

SAMPLE ID: SAISS304XX

SAMPLE COMMENTS:

Beginning Depth: .00 Ending Depth: .00

WRK REQUEST EXTRACTION

SDG# :

***** ANALYSIS ***** LOC DATE EXP DATE EXP DATE

SR-90 BY GFPC DOE 7500-SR MOD 06 1/08/01 0/00/00 7/02/01

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXL-1-AA Protocol: A QC Program: STANDARD TEST SET

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY STL St. Louis

Run Date: 1/08/01

· Time: 9:02:07

User Id.: CLARKEJ

378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-014

PROJECT #: VA WORK ORDER: DTCXM

REPORT TO: Tim Taylor RECEIVING DATE: 1/08/01

P.O. NUMBER: SAMPLING DATE: 1/03/01 SITE: St. Albana

ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01 AMOUNT REC"D: 120G

STORAGE LOC: RAD PRIORITY: 28

LOT COMMENTS: SAMPLING TIME: 15:00

MATRIX: SOLID RECEIVING TIME: 9:10

SAMPLE ID: SAISS305XX

QC PACKAGE: CLP SDG# : SAMPLE COMMENTS:

Beginning Depth: .00 Ending Depth: .00

WRK REQUEST EXTRACTION ANALYSIS ***** ANALYSIS ***** <u>LOC</u> DATE EXP DATE EXP DATE

SR-90 BY GFPC DOE 7500-SR MOD 06 1/08/01 0/00/00 7/02/01

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXM-1-AA Protocol: A QC Program: STANDARD TEST SET

PSL20300

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY

Run Date: 1/08/01

Time: 9:02:07 User Id.: CLARKEJ

STL St. Louis

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

LAB ID: F-1A080114-015 PROJECT MANAGER: Ron Martino

PROJECT #: VA WORK ORDER: DICKN

REPORT TO: Tim Taylor RECEIVING DATE: 1/08/01

SAMPLING DATE: 1/03/01 P.O. NUMBER: ANALYTICAL DUE DATE: 2/05/01N SITE: St. Albans

REPORT DUE DATE: 2/06/01 AMOUNT RECTD: 120G

STORAGE LOC: RAD PRIORITY: 28

SAMPLING TIME: LOT COMMENTS: 15:00

RECEIVING TIME: MATRIX: SOLID 9:10

SAMPLE ID: SA1S5306XX QC PACKAGE: CLP SDG# :

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PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXN-1-AA Protocol: A QC Program: STANDARD TEST SET

SEVERN TRENT LABORATORIES, INC Run Date: 1/08/01 CLIENT ANALYSIS SUMMARY

STL St. Louis

Time: 9:02:07

User Id.: CLARKEJ



CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-016

WORK ORDER: DICXP PROJECT #: VA

Tim Taylor RECEIVING DATE: 1/08/01 REPORT TO: SAMPLING DATE: 1/03/01

P.O. NUMBER: SITE: St. Albans

ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01 AMOUNT REC"D: 120G

PRIORITY: 28 STORAGE LOC: RAD

SAMPLING TIME: 15:00 LOT COMMENTS:

RECEIVING TIME: MATRIX: SOLID

SAMPLE ID: SAISS307XX QC PACKAGE: CLP SDG# :

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Beginning Depth: .00 Ending Depth:

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(A-HL-ZP-01) DTCXP-1-AA Protocol: A QC Program: STANDARD TEST SET

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SEVERN TRENT LABORATORIES, INC Rum Date: 1/08/01 CLIENT ANALYSIS SUMMARY

STL St. Louis

Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562 LAH ID: F-1A080114-017

PROJECT MANAGER: Ron Martino

WORK ORDER: DTCXQ

0/00/00

PROJECT #: VA REPORT TO:

Tim Taylor

P.O. NUMBER:

RECEIVING DATE: 1/08/01 SAMPLING DATE: 1/03/01

SITE: St. Albans

ANALYTICAL DUE DATE: 2/05/01N

AMOUNT REC'D: 120G

REPORT DUE DATE: 2/06/01

STORAGE LOC: RAD LOT COMMENTS:

PRIORITY: 28

MATRIX: SOLID

SAMPLING TIME: 15:00 RECEIVING TIME: 9:10

SAMPLE ID: SAISS308XX .

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QC PACKAGE: CLP SAMPLE COMMENTS: SDG# :

Beginning Depth: .00 Ending Depth:

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SR-90 BY GFPC DOE 7500-SR MOD 06 1/08/01 PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-ZP-01) DTCXQ-1-AA Protocol: A QC Program: STANDARD TEST SET

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY STL St. Louis

Time: 9:02:07

Rum Date: 1/08/01

User Id : CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino

IAB ID: F-1A080114-018

PROJECT #: VA

WORK ORDER: DTCXR

REPORT TO:

P.O. NUMBER:

RECEIVING DATE: 1/08/01 SAMPLING DATE: 1/03/01

SITE: St. Albans AMOUNT REC"D: 120G ANALYTICAL DUE DATE: 2/05/01N

STORAGE LOC: RAD

REPORT DUE DATE: 2/06/01 PRIORITY: 28

LOT COMMENTS:

SAMPLING TIME: 15:00

MATRIX: SOLID

RECEIVING TIME:

9:10

SAMPLE ID: SA1SS309XX

OC PACKAGE: CLP SAMPLE COMMENTS: SDG# :

Beginning Depth: .00 Ending Depth:

Tim Taylor

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PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

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SEVERN TRENT LABORATORIES, INC Run Date: 1/08/01 CLIENT ANALYSIS SUMMARY

STL St. Louis

Time: 9:02:07

User Id : CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-019

PROJECT #: VA WORK ORDER: DTCXV

REPORT TO: Tim Taylor RECEIVING DATE: 1/08/01

P.O. NUMBER: SAMPLING DATE: 1/03/01

ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01 SITE: St. Albana

AMOUNT REC"D: 120G

STORAGE LOC: RAD PRIORITY: 28

LOT COMMENTS: SAMPLING TIME: 15:00

MATRIX: SOLID RECEIVING TIME: 9:10 SAMPLE ID: SAISS310XX

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REPORT TO:

SEVERN TRENT LABORATORIES, INC Run Date: 1/08/01 CLIENT ANALYSIS SUMMARY

STL St. Louis

Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino

LAB ID: F-1A080114-020

WORK ORDER: DICXW PROJECT #: VA

> Tim Taylor RECEIVING DATE: 1/08/01 SAMPLING DATE: 1/03/01

> > SDG# :

P.O. NUMBER: ANALYTICAL DUE DATE: 2/05/01N SITE: St. Albans

REPORT DUE DATE: 2/06/01

AMOUNT REC'D: 120G

STORAGE LOC: RAD PRIORITY: 28

SAMPLING TIME: 15:00 LOT COMMENTS:

RECEIVING TIME: 9:10 MATRIX: SOLID

SAMPLE ID: SAISS311XX OC PACKAGE: CLP

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Beginning Depth: .00 Ending Depth: .00

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SEVERN TRENT LABORATORIES, INC Rum Date: 1/08/01 CLIENT ANALYSIS SUMMARY

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Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-021

PROJECT #: VA WORK ORDER: DTCX0

Tim Taylor REPORT TO: RECEIVING DATE: 1/08/01

SAMPLING DATE: 1/03/01 P.O. NUMBER:

SITE: St. Albans ANALYTICAL DUE DATE: 2/05/01N REPORT DUE DATE: 2/06/01 AMOUNT REC"D: 120G

STORAGE LOC: RAD PRIORITY: 28

SAMPLING TIME: 15:00 LOT COMMENTS:

MATRIX: SOLID RECEIVING TIME: 9:10

SAMPLE ID: SA1SS301KD

OC PACKAGE: CLP SAMPLE COMMENTS:

Beginning Depth: .00 Ending Depth: .00

WRK REQUEST EXTRACTION ANALYSIS ***** ANALYSIS ***** LOC DATE EXP DATE EXP DATE

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SR-90 BY GFPC DOE 7500-SR MOD 1/08/01 0/00/00 7/02/01 06

PREP RC-0003 , RC-0004 , SEP RC-0050 , CT SL-13021

(A-HL-2P-01) DTCX0-1-AA Protocol: A QC Program: STANDARD TEST SET

SAMPLE COMMENTS:

SEVERN TRENT LABORATORIES, INC CLIENT ANALYSIS SUMMARY

STL St. Louis

Run Date: 1/08/01

Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

PROJECT MANAGER: Ron Martino LAB ID: F-1A080114-022

PROJECT #: VA WORK ORDER: DTCX1

REPORT TO: Tim Taylor

RECEIVING DATE: 1/08/01 SAMPLING DATE: 1/03/01 P.O. NUMBER:

SITE: St. Albans ANALYTICAL DUE DATE: 2/05/01N

AMOUNT RECTO: 120G REPORT DUE DATE: 2/06/01 STORAGE LOC: RAD PRIORITY: 28

LOT COMMENTS: SAMPLING TIME: 15:00

MATRIX: SOLID RECEIVING TIME: 9:10

SAMPLE ID: SAISS309XD

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Time: 9:02:07

User Id.: CLARKEJ

CLIENT: 378644 STONE & WEBSTER ENGINEERING CORPORATION QUOTE/SAR #: 38562

LAB ID: F-LA080114-023 PROJECT MANAGER: Ron Martino

WORK ORDER: DTCX2 PROJECT #: VA

Tim Taylor RECEIVING DATE: 1/08/01 REPORT TO:

SAMPLING DATE: 1/03/01 P.O. NUMBER:

ANALYTICAL DUE DATE: 2/05/01N SITE: St. Albans

AMOUNT RECTD: 120G REPORT DUE DATE: 2/06/01

STORAGE LOC: RAD PRIORITY: 28

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F.		- 1	·										1	
Comments		, .												
DISTRIBUTION: WHITE STATES WITH SOMME COMME	Comment	ق سم							3					
DISTRIBUTION: WANTE . States with Samula: CAMAS	V - Botuned to f	Hont with	Benout DINK - Ele	M Cook										

SURVEY UNIT 5 (Confidor	45. Treatment Unit and Associated Equipment Room, and Foyer at Foot of Sta
SOIL SAMPLE	
DESIGNATION	COLLECTION LOCATION DESCRIPTION
SA5SS301XX	Stainless steel/cast iron common trench crossing corridor 45 porth side
SASSS302XX	Stainless steel/cest iron common trench crossing corridor 45 center
SA55S303XX	Steinless steel/cast iron common trench crossing corridor 45 south side
SA5SS302XD	Stainless sizet/cast iron common trench crossing conidor 45 center - Duplicate Sample

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St.	IRVEY UNIT 18 (Counting Room, Wash Room & Corridor 15)
SOIL SAMPLE DESIGNATION	COLLECTION LOCATION DESCRIPTION
SA1SS312XX	Stainless stoel/cast iron common trench approximately 12 ft east of emergency shower dr
SA1S5313XX	Stainless steel/cast iron common trench crossing comdor 15 ramp north side
SA1SS314XX	Stainless steel/cast Iron common trench crossing contider 15 ramp south side
SA1SS315XX	Cast iron common french piping trench beneath distillation sink area in closef
SA1SS316XD	Stainless steel/cast iron common trench crossing corridor 15 ramp south side - Duplicate
31425	

<u> </u>	Soil Sample Designation	COLLECTION LOCATION DESCRIPTION
	SA1SS301XX	Stairdess steel piping trench below high level lab sink
	SA185302XX	Sizinless steet piping trench under high level leb fume hood drain north end
	SA188303XX	Stainless steet piping trench under high level tab fume hood drain south and
I	SA188304XX	Stainters steel piping trench below hav level lab sink northwest corner
	SA1SS305XX	Statistess steet piping trench below UST area
	SA1SS306XX	Stainless steel piping trench junction of low level sink and UST drain lines
	SA185307XX	Stainlass sleet plaing trench below low tevel lab sink northeast comer
	SA1SS308XX	Stainless steel pipe french beneath low level lab cabinat area
	\$A1\$\$309XX	Cast Iron piping trench beneath amergency shower drain area
·	SA18S310XX	Stainless steel/cast from common trench approximately 4 ft east of emergency shower drain
	SA198311XX	Stainless steel/cast Iron common trench approximately 8 ft east of emergency shower drain
	SA188301XD	Stainless steel piping trench below high level lab sink - Duplicate
·	SA1SS308XD	Cast Iron ploing french beneath emergency shower drain area - Duplicate
	SA1SS311XD	Stainless steel/cast iron common trench approximately 8 it east of emergency shower drain

, Later



STL St. Louis 13715 Rider Trail North Earth City, MO 63045

Tel 314 298 8566 Fax 314 298 8757 www.stl-inc.com

ANALYTICAL REPORT

PROJECT NO. VA

St. Albans

Lot #: F0J240212

Tim Taylor

Stone & Webster Engineering Co 245 Summer Street Boston, MA 02210

SEVERN TRENT LABORATORIES, INC.

Ron Martino Project Manager

November 30, 2000

STL St. Louis is a part of Severn Trent Laboratories, Inc.

Case Narrative LOT NUMBER: F0J240212

This report contains the analytical results for the two samples received under chain of custody by STL St. Louis on October 24, 2000. These samples are associated with your St. Albans project.

All applicable quality control procedures met method-specified acceptance criteria.

Observations/Nonconformances

There were no anomalies with this analysis.

METHODS SUMMARY

F0J240212

ANALYTICAL

PREPARATION

PARAMETER

METHOD

METHOD

H-3 by Distillation & LSC by LSC

SMWW 7500-SR MO

STRONTIUM 90 Sr90-Y90 cal

EPA 906.0 MOD

References:

EPA

"EASTERN ENVIRONMENTAL RADIATION FACILITY RADIOCHEMISTRY

PROCEDURES MANUAL" US EPA EPA 520/5-84-006 AUGUST 1984

SMWW

"STANDARD METHODS FOR WASTE WATER"

SAMPLE SUMMARY

F0J240212

WO # SAMPLE# CLIENT SAMPLE ID	DATE TIME
DNNCG 001 DRUM 001-LAB WATER DNNCL 002 DRUM 002-LAB WATER	10/19/00 16:00 10/19/00 16:00

NOTE (S):

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

STONE & WEBSTER ENGINEERING CORPORATION

Client Sample ID: DRUM 001-LAB WATER

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F0J240212-001

Work Order:

DNNCG

Matrix:

WATER

Date Collected: 10/19/00

Date Received:

10/24/00 0845

Parameter	Result	Qual	Total Uncert. (2 _o +/-)	мос	Prep Date	Analysis Date Batch	ı# Yld %
TRITIUM (Distil	11) by EPA 906	0 MOD	pC	1/L	906,0	MOD .	
Tritium	20	U	160	270	11/13/00	11/15/00 03182	34 .
SR-90 BY GFFC S	MWW 7500-SR M	סס	pC	i/L	7500-8	R MOD	
Strontium 90	183		36	2	10/31/00	11/13/00 03051	70 74

STONE & WEBSTER ENGINEERING CORPORATION

Client Sample ID: DRUM 002-LAB WATER

Quanterra, Inc. - Radiochemistry

Lab Sample ID: F0J240212-002

Work Order: Matrix:

DNNCL WATER Date Collected: 10/19/00

1600

Date Received:

10/24/00 0845

Parameter	Result	Qua1	Total Uncert. (2 o+/-)	жос	Prep Date	Analysis Date	Batch #	Ald #
TRITIUM (Disti	11) by EPA 906.	O MOD	pCi	/L	906.0	MOD		
Tritium	-50	Ū	160	280	11/13/0	00 11/15/00	0318234	
SR-90 BY GFPC	SMWW 7500-SR M	מפ	pCi	./L	7500-	SR MOD		
Strontium 90	195		38	· 2	10/31/	00 11/13/00	0305170	88

METHOD BLANK REPORT

Quanterra, Inc. - Radiochemistry

Client Lot ID:

F0J240212

Matrix:

WATER

		•	Total			•	Lab Sample ID		
Parameter	Result	Qual	Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date	Batch #	Alg #	
SR-90 BY GFPC	SMWW 7500-SR N	OD	pCi/L	7500-SR MOD		F0 J 3	10000-170	B	
Strontium 90	0.8	Ü	2.3	4.0	10/31/00	11/15/00	0305170	84	
TRITIUM (Disti	Ll) by EPA 906	.0 MOD	pCi/L	906.0 MOD		FOK1	30000-234	B	
Tritium	10	υ?	150	260	11/13/00	11/15/00	0318234		

(8)

are incomplete without the case narrative.

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

? For informational purposes only. The result does not follow significant figures SOP Result is less than the sample detection limit.

Laboratory Control Sample/LCS Duplicate Report



Quanterra, Inc. - Radiochemistry

Client Lot ID:

F0J240212

Matrix:

WATER

		`	Total				Lab Sample ID			
Parameter	Spike Amount		Result	Uncert. (2 c+/-)			QC Control Limits	Precision		
SR-90 BY GFPC	SMWW	7500-SR MOD	pCi/I	7500-	SR MOD		FOJS	310000-170C	•	
Strontium 90	Spk 2	9.59 9.59 Batch #:	9.4 10.3 0305170	2.4 2.2	88 81 Analysi	98 107 sDate:	(34 - 126) (34 - 126) 11/13/00	9 RPD		



STL ST. LOUIS

Radiochemical Analysis By

Severn Trent Laboratories Richland

2800 G.W. Way, Richland, Wa 99352, (509) 375-3131

Data Package Contains // Pages

Report Nbr: 11892

SDG Nbr	ORDER Nbr	CLIENT ID NUMBER	LOT Nbr	WORK ORDER	RPT DB ID	BATCH
15889		DRUM 001	F0J24021200	DNNCG1AD	9DNNCG10	0304331
		DRUM 002	F0J24021200	DNNCL1AD	9DNNCL10	0304331

0001



CERTIFICATE OF ANALYSIS

STL Richtand 2800 George Washington Way Richland, WA 99352-1613

Tel: 509 375 3131 Fax: 509 375 5590 www.stl-inc.com

STL St. Louis 13715 Rider Trail North Earth City, MO 63045

November 17, 2000

Attention: Ron Martino

Date Samples Received

October 25, 2000

Sample Type

Water

SDG Number

15889

Client

Stone and Webster

I. Introduction

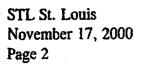
On October 25, 2000 water samples were received by the STL Richland Laboratory for radiochemical analysis. Upon receipt, the samples were assigned the laboratory ID numbers to correspond with the client specific ID's as found on the first page of the attached report. The samples were logged into Lot F0J240212.

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

The requested analyses were:

Liquid Scintillation Counting
Carbon 14 by Method RICH-RC-5022





STL Richland

2800 George Washington Way Richland, WA 99352-1613

Tel: 509 375 3131 Fax: 509 375 5590 www.stl-inc.com

II. Quality Control

The analytical results for each analysis performed under SDG 15889 include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Liquid Scintillation Counting

Carbon 14 by Method RICH-RC-5022

The LCS, batch blank, samples and sample duplicates results are within requirements.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. The Laboratory Manager or a designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Reviewed and approved:

Doug Swenson

Project Manager

Drinking Water Method Cross References

	DRINKING WAT	ER METHOD CROSS REFERENC
Referenced Method	Isotope(s)	STL Richland's SOP number
EPA 901.1	Cs-134, I-131	RICH-RC-5017
EPA 900.0	Alpha & Beta	RICH-RC-5014
EPA 903.1	Ra-226	RICH-RC-5005
EPA 904.0	Ra-228	RICH-RC-5005
EPA 905.0	Sr89/90	RICH-RC-5006
ASTM D2460-70	Total Radium	RICH-RC-5027
Standard Method 7500-U-C & ASTM D57174-91	Uranium .	RICH-RC-5058
Tritium	Tritium	RICH-RC-5007
NOTE:		
The Gross Alpha LCS is prepared with Am-241 (u The Gross Beta LCS is prepared with Sr/Y-90 (un		

Uncertainty Estimation

STL Richland has adopted the internationally accepted approach to estimating uncertainties described in "NIST Technical Note 1297, 1994 Edition". The approach, "Law of Propagation of Errors", involves the identification of all variables in an analytical method which are used to derive a result. These variables are related to the analytical result (R) by some functional relationship, R = constants * f(x,y,z,...). The components (x,y,z) are evaluated to determine their contribution to the overall method uncertainty. The individual component uncertainties (u_i) are then combined using a statistical model that provides the most probable overall uncertainty value. All component uncertainties are categorized as type A, evaluated by statistical methods, or type B, evaluated by other means. Uncertainties not included in the components, such as sample homogeneity, are combined with the component uncertainty as the square root of the sum-of-the-squares of the individual uncertainties. The uncertainty associated with the derived result is the combined uncertainty (u_e) multiplied by the coverage factor (1,2, or 3).

When three or more sample replicates are used to derive the analytical result, the type A uncertainty is the standard deviation of the mean value (S/vn), where S is the standard deviation of the derived results. The type B uncertainties are all other random or non-random components that are not included in the standard deviation.

The derivation of the general "Law of Propagation of Errors" equations and specific example are available on request.





Sample Results Summary Severn Trent Laboratories Richland

REPORT No.: 11892

SDG NBR: 15889

CLIENT ID	WORK ORDER NUMBER	PARAMETER	RESULT	UNITS	YIELD	MDA	
DRUM 001	DNNCG1AD	C-14	3.00E+00 +- 6.11E+00 (2s)	pCi/L	100.00%	9.11E+00	•
DRUM 001	DNNCG1AE .	C-14	-4.25E+00 +- 5.75E+00 (2s)	pCl/L	100.00%	9.13E+00	
DRUM 002	DNNCL1AD	C-14	1.25E+00 +- 6.02E+00 (2s)	pCi/L	100.00%	9.11E+00	•
BLANK QC	DN2WR1AA	C-14	-6.72E-01 +- 5.93E+00 (2s)	pCl/L	100.00%	9.11E+00	
LCS	DN2WR1AC	C-14	3.87E+01 +- 9.01E+00 (2s)	pCl/L	100.00%	1.05E+01	
Number of Results:	!5		•			•	





SAMPLE RESULTS

LAB NAME:

STL Richland

SDG:

15889

COLLECTION DATE: 10/19/00 4:00:00 PM

LOT,RPT DB ID:

F0J240212-00 9DNNCG10

REPORT NBR: 11892

RECEIVED DATE:

CLIENT ID:

DRUM 001

ORDER NBR:

MATRIX:

Water

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDC	REPORT UNIT	YIELD	RST/MDC	rsi/Cnterr	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
Batch: 0304331 C-14	Work Order: 3.00E+00	DNNCG1AD 1.9E-01	6.1E+00	9.11E+00	pCi/L	100.00%	0.33	(31.8)	11/16/00 01:33 a	0.2	L	LSC6	RICHRC5022
Number of Results	s: 1 ·												•



SAMPLE RESULTS

LAB NAME:

STL Richland

SDG:

15889

COLLECTION DATE: 10/19/00 4:00:00 PM

LOT, RPT DB ID:

F0J240212--00 9DNNCL10

REPORT NBR: 11892

RECEIVED DATE:

CLIENT ID:

DRUM 002

ORDER NBR:

MATRIX:

Water

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDC	REPORT UNIT	YIELD	RST/MDC	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
Batch: 0304331 C-14	Work Order: 1.25E+00	DNNCL1AD 8.0E-02	6.0E+00	9.11E+00	pCI/L	100.00%	0.14	(31.4)	11/16/00 02:57 a	0.2	L	LSC6	RICHRC5022

Number of Results: 11



LAB NAME:

STL Richland

SDG:

15889

COLLECTION DATE: 10/19/00 4:00:00 PM

RPT DB ID/ORIG ID: DNNCG1ER / 9DNNCG10

REPORT NBR: 11892

RECEIVED DATE:

CLIENT ID:

DRUM 001

ORDER NBR:

MATRIX.

Water

	ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDC	REPORT UNIT	YIELD	ORIG RESULT	RPD	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
Bate	h: 0304331	Work Order:	DNNCG1AE											
	C-14	-4.25E+00	2.8E-01	5.8E+00	9.13E+00	pCi/L	100.00%	3.00E+00	1159.63%	11/16/00 02:15	0.2	L	LSC6	RICHRC5022

Number of Results: 1



FORM II

BLANK RESULTS

LAB NAME:

STL Richland

SDG:

15889

ORDER NBR:

LOT,RPT DB ID: J0J300000-331 DN2WR1AX

REPORT NBR: 11892

MATRIX:

WATER

	ISOTOPE	RESULT	COUNTING ERROR (25)	TOTAL ERROR (2s)	MDC	REPORT UNIT	YIELD	RST/MDC	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
. •	Batch: 0304331 C-14	Work Order: -6.72E-01	DN2WR1AA 4.4E-02	5.9E+00	9.11E+00	pCl/L	100,00%	-0.07	(30.9)	11/16/00 12:09 8	a 0.2	L	LSC6	RICHRC5022

Number of Results: 1



LABORATORY CONTROL SAMPLE

.

LAB NAME:

STL Richland

SDG:

15889

ORDER NBR:

LOT, RPT DB ID:

J0J300000-331 DN2WR1CS

REPORT NBR: 11892

MATRIX:

WATER

Date: 11/17/00

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDC	REPORT UNIT	YIELD	Expected	Expected Uncert	Recovery	Analysis Date	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
Batch: 0304331 C-14 Number of Result	3.87E+01	DN2WR1AC 2.2E+00	9.0E+00	1.05E+01	pCi/L	100.00%	4.62E+01	0.0E+00	83.63%	11/16/00 12:51	0.2	L	LSC6	RICHRC5022

0910

Severn Trent Laboratories, Inc SAMPLE ANALYSIS REQUISITION

SDL 15889

LABORATORY:

STL Richland

2800 George Washington Way

Richland

WA 99352-1613,W

NEED ANALYTICAL REPORT BY 11/20/00

ATTN:

LAB PURCHASE ORDER: SR027163

CLIENT CODE:

378644 PROJECT MANAGER: Ron Martino

NUMBER OF SAMPLES IN LOT: 0000

SAMPLING DATE ANALYSIS REQUIRED. SAMPLE I.D. 10/19/00 Carbon-14 by Liquid Scint F0J240212-001 (RC14) METHOD: C-14 by LSC DNNCG-1-AD F0J240212-002 10/19/00 Carbon-14 by Liquid Scint (RC14) METHOD: C-14 by LSC DNNCL-1-AD

NEED DETECTION LIMIT AND ANALYSIS DATE INCLUDED IN REPORT.
SHIPPING METHOD: AIREBORNE DATE: 10/24/00
SEND REPORT TO: RON MARTINO
SAMPLE RECEIVED BY: A. DINGLING DATE: 1015-00103C
PLEASE SEND A SIGNED COPY OF THIS FORM WITH REPORT AT COMPLETION OF ANALYSIS.
THANK YOU.
STL St. Louis
INT: 10/24/00 14:09:50
STL Richland
2800 George Washington Way
Richland WA 99352-1613,W
0012
RELINQUISHED BY: John Walter DATE/TIME: 10.24.00 15:30
RELINQUISHED BY: DATE/TIME:
DRIE/IIME:
POLIVED FOR LAB BY: DATE/TIME:
DIENCE DEWEIGH ORIGINAL CAMPAN AND AND ADDRESS OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY
PLEASE RETURN ORIGINAL SAMPLE ANALYSIS REQUISITION



STL St. Louis 13715 Rider Trail North Earth City, MO 63045

Tel 314 298 8566 Fax 314 298 8757 www.stl-inc.com

ANALYTICAL DRAFT REPORT

PROJECT NO. VA

St. Albans

Lot #: F0J240212

Tim Taylor

Stone & Webster Engineering Co 245 Summer Street Boston, MA 02210

SEVERN TRENT LABORATORIES, INC.

Ron Martino Project Manager

November 27, 2000

STL St. Louis is a part of Severn Trent Laboratories, Inc.

METHODS SUMMARY

F0J240212

PARAMETER ANALYTICAL PREPARATION METHOD METHOD

H-3 by Distillation & LSC by LSC EPA 906.0 MOD

H-3 by Distillation & LSC by LSC STRONTIUM 90 Sr90-Y90 cal

EPA 906.0 MOD SMWW 7500-SR MO

References:

EPA "EASTERN ENVIRONMENTAL RADIATION FACILITY RADIOCHEMISTRY

PROCEDURES MANUAL" US EPA EPA 520/5-84-006 AUGUST 1984

SMWW "STANDARD METHODS FOR WASTE WATER"

SAMPLE SUMMARY

F0J240212

WO #	SAMPLE#	CLIE	T SAMPL	B ID	DATE	TIME
DNNCG DNNCL	001 002		001-LAB 002-LAB		10/19/00 10/19/00	

NOTE (S) :

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

STONE & WEBSTER ENGINEERING CORPORATION

Client Sample ID: DRUM 001-LAB WATER

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F0J240212-001

Work Order: Matrix:

DNNCG WATER Date Collected: 10/19/00 1600

· Date Received:

10/24/00 0845

Parameter	Result	Qual	Total Uncert. (2 \sigma+/-)		мос	Prep Date	Analysis Date	Batch #	Yld %
TRITIUM (Distill)	by EPA 906.	O MOD		pCi/L		906.0 1	MOD COM		<u> </u>
Tritium	0.0		0.0	<u>.</u>	0.0	11/13/00		0318234	
SR-90 BY GFPC SMW	7500-SR MO	D .		pCi/L		7500-81	R MOD		
Strontium 90	183		36		2	10/31/00	11/13/00	0305170	74

STONE & WEBSTER ENGINEERING CORPORATION

Client Sample ID: DRUM 002-LAB WATER

Quanterra, Inc. - Radiochemistry

Lab Sample ID: F0J240212-002

Work Order:

DNNCL

Matrix:

WATER

Date Collected: 10/19/00 1600

Date Received: 10/24/00 0845

Parameter	Result	Qual.	Total Uncert. (2 o+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
TRITIUM (Dist	ill) by EPA 906.	O MOD	pq	Ci/L	906.0	MOD	•	
Tritium	0.0		0.0	0.0	11/13/0	0	0318234	
SR-90 BY GFPC	SMWW 7500-SR MC	מכ	p	i/L	7500-	SR MOD		
Strontium 90	195	·	38	2 .	10/31/0	0 11/13/00	0305170	68 .



Quanterra, Inc. - Radiochemistry

Client Lot ID:

F0J240212

Matrix:

WATER

		•	Total			Lab	Sample ID	
Parameter	Result	Qual	Uncert. (2 gt/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
SR-90 BY GFPC	SMWW 7500-SR 1	10D	pCi/L	7500-SR MOD		F0J3	10000-170	B
Strontium 90	0.8	U	2.3	4.0	10/31/00	11/15/00	0305170	84
TRITIUM (Disti	11) by EPA 906	5.0 MOD	· pCi/L	906.0 MOD		F0K1	30000-234	В
Tritium			•		11/13/00		0318234	

No (S)

Are incomplete without the case narrative.

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

Result is less than the sample detection limit.

Laboratory Control Sample/LCS Duplicate Report

Quanterra, Inc. - Radiochemistry

Client Lot ID:

F0J240212

Matrix:

WATER

					Total			Lab a	Sample ID	
Parameter		Spike Amount	Result		Uncart. (2 a+/-)	& Yld	% Rec	QC Control Limits	Precisi	on
SR-90 BY GFPC	SMWW	7500-SR MOD		pCi/L	7500-	SR MOD		F0J3	10000-17	OC.
Strontium 90	Spk 2	9.59 9.59	9.4 10.3		2.4 2.2	88 81	98. 107	(34 - 126) (34 - 126)	9	RPD
•		Batch #:	0305170	•	•	Analysi	sDate:	11/13/00	•	

Analytical Data Package Prepared For

STL ST. LOUIS

Radiochemical Analysis By

Severn Trent Laboratories Richland

2800 G.W. Way, Richland, Wa 99352, (509) 375-3131

Data Package Contains __//_ Pages

Report Nbr: 11892

SDG Nbr	ORDER Nbr	CLIENT ID NUMBER	LOT Nbr	WORK ORDER	RPT DB ID	ВАТСН
15889		DRUM 001	F0J24021200	DNNCG1AD	9DNNCG10	0304331
		DRUM 002	F0J24021200	DNNCL1AD	9DNNCL10	0304331

1000



CERTIFICATE OF ANALYSIS

STL Richland 2800 George Washington Way Richland, WA 99352-1613

Tel: 509 375 3131 Fax: 509 375 5590 www.stHnc.com

STL St. Louis 13715 Rider Trail North Earth City, MO 63045

November 17, 2000

Attention: Ron Martino

Date Samples Received

October 25, 2000

Sample Type

Water

SDG Number

15889

Client

Stone and Webster

I. Introduction

On October 25, 2000 water samples were received by the STL Richland Laboratory for radiochemical analysis. Upon receipt, the samples were assigned the laboratory ID numbers to correspond with the client specific ID's as found on the first page of the attached report. The samples were logged into Lot F0J240212.

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

The requested analyses were:

Liquid Scintillation Counting
Carbon 14 by Method RICH-RC-5022

STL St. Louis November 17, 2000 Page 2

II.



STL Richland 2800 George Washington Way Richland, WA 99352-1613

Tel: 509 375 3131 Fax: 509 375 5590

The analytical results for each analysis performed under SDG 15889 include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Liquid Scintillation Counting

Quality Control

Carbon 14 by Method RICH-RC-5022

The LCS, batch blank, samples and sample duplicates results are within requirements.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. The Laboratory Manager or a designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Reviewed and approved:

Doug Swenson Project Manager

Drinking Water Method Cross References

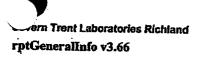
	DRINKING WATI	ER METHOD CROSS REFERENCE
Referenced Method	Isotope(s)	STL Richland's SOP number
EPA 901.1	Cs-134, I-131	RICH-RC-5017
EPA 900.0	Alpha & Beta	RICH-RC-5014
EPA 903.1	Ra-226	RICH-RC-5005
EPA 904.0	Ra-228	RICH-RC-5005
EPA 905.0	Sr89/90	RICH-RC-5006
ASTM D2460-70	Total Radium	RICH-RC-5027
Standard Method 7500-U-C & ASTM D57174-91	Uranium	RICH-RC-5058
Tritium	Tritium	RICH-RC-5007
NOTE:		
The Gross Alpha LCS is prepared with Am-241 (u	nless otherwise so	ecified in the case narrative)
The Gross Beta LCS is prepared with Sr/Y-90 (un		

Uncertainty Estimation

STL Richland has adopted the internationally accepted approach to estimating uncertainties described in "NIST Technical Note 1297, 1994 Edition". The approach, "Law of Propagation of Errors", involves the identification of all variables in an analytical method which are used to derive a result. These variables are related to the analytical result (R) by some functional relationship, R = constants * f(x,y,z,...). The components (x,y,z) are evaluated to determine their contribution to the overall method uncertainty. The individual component uncertainties (u_i) are then combined using a statistical model that provides the most probable overall uncertainty value. All component uncertainties are categorized as type A, evaluated by statistical methods, or type B, evaluated by other means. Uncertainties not included in the components, such as sample homogeneity, are combined with the component uncertainty as the square root of the sum-of-the-squares of the individual uncertainties. The uncertainty associated with the derived result is the combined uncertainty (u_c) multiplied by the coverage factor (1,2, or 3).

When three or more sample replicates are used to derive the analytical result, the type A uncertainty is the standard deviation of the mean value (S/vn), where S is the standard deviation of the derived results. The type B uncertainties are all other random or non-random components that are not included in the standard deviation.

The derivation of the general "Law of Propagation of Errors" equations and specific example are available on request.





Sample Results Summary Severn Trent Laboratories Richland

REPORT No.: 11892

SDG NBR: 15889

CLIENT ID	WORK ORDER NUMBER	PARAMETER	RESULT	UNITS	YIELD	MDA
DRUM 001	DNNCG1AD	C-14	3.00E+00 +- 6.11E+00 (2s)	pCl/L	100.00%	9.11E+00
DRUM 001	DNNCG1AE	C-14	-4.25E+00 +- 5.75E+00 (2s)	pCi/L	100.00%	9.13E+00
DRUM-002	DNNCL1AD	C-14	1.25E+00 +- 6.02E+00 (2s)	рСVL	100.00%	9.11E+00 .
BLANK QC	DN2WR1AA	C-14	-6.72E-01 +- 5.93E+00 (2s)	pCi/L	100.00%	9.11E+00
LCS	DN2WR1AC	C-14	3.87E+01 +- 9.01E+00 (2s)	pCi/L	100.00%	1.05E+01
mber of Results:	15			•		



FORM I

SAMPLE RESULTS

LAB NAME:

STL Richland

SDG:

15889

COLLECTION DATE: 10/19/00 4:00:00 PM

LOT,RPT DB ID:

F0J240212-00 9DNNCG10

REPORT NBR: 11892

RECEIVED DATE:

CLIENT ID:

DRUM 001

ORDER NBR:

MATRIX:

Water

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDC	REPORT UNIT	YIELD	RST/MDC	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
Batch: 0304331 C-14	Work Order: 3.00E+00	DNNCG1AD 1.9E-01	6.1E+00	9.11E+00	pCl/L	100.00%	0.33	(31.8)	11/16/00 01:33 a	0.2	L.	LSC6	RICHRC5022
Number of Results:	. 1									•			





SAMPLE RESULTS

LAB NAME:

STL Richland

SDG:

15889

COLLECTION DATE: 10/19/00 4:00:00 PM

LOT,RPT DB ID:

F0J240212-00 9DNNCL10

REPORT NBR: 11892

RECEIVED DATE:

CLIENT ID:

DRUM 002

ORDER NBR:

MATRIX:

Water

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDC	REPORT UNIT	YIELD	rst/mdc 1	rsi/Cnterr	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
Batch: 0304331 C-14	Work Order: 1.25E+00	DNNCL1AD 8.0E-02	6.0E+00	9.11E+00	pCl/L	100.00%	0.14	(31.4)	11/16/00 02:57 a	0.2	L	LSC6	RICHRC5022
Number of Results	s: i1							•					•



Date: 11/17/00

FORM II **DUPLICATE RESULTS**

LAB NAME:

STL Richland

SDG:

15889

COLLECTION DATE: 10/19/00 4:00:00 PM

RPT DB ID/ORIG ID: DNNCG1ER / 9DNNCG10

REPORT NBR: 11892

RECEIVED DATE:

Water

CLIENT ID:

DRUM 001

ORDER NBR:

MATRIX:

IS	OTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDC	REPORT UNIT	AIETD	ORIG RESULT	RPD	analysis Date	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
Batch:	0304331 C-14	Work Order: -4.25E+00	DNNCG1AE 2.8E-01	5.8E+00	9.13E+00	pCi/L	100.00%	3.00E+00	1159.63%	11/16/00 02:15	0.2	L	LSC6	RICHRC5022

Number of Results: 1



Date: 11/17/00

BLANK RESULTS

LAB NAME:

STL Richland

SDG:

15889

ORDER NBR:

LOT,RPT DB ID:

J0J300000-331 DN2WR1AX

REPORT NBR: 11892

MATRIX:

WATER

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2s)	М́DС	REPORT UNIT	YIELD	RST/MDC	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
Batch: 0304331 C-14	Work Order: -6.72E-01	DN2WR1AA 4.4E-02	5.9£+00 \	9.11E+00	pCl/L·	100.00%	-0.07	-(30.9)	11/16/00 12:09	a 0,2	L	LSC6	RICHRC5022

Comments:





Date: 11/17/00

FORM II

LABORATORY CONTROL SAMPLE

LAB NAME:

STL Richland

SDG:

15889

ORDER NBR:

LOT,RPT DB ID: J0J300000-331 DN2WR1CS

REPORT NBR: 11892

MATRIX:

WATER

ISOTO	OPE I	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDC	REPORT	YIELD	Expected	Expected Uncert	Recovery	analysis Date	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
C-		Vork Order: 3.87E+01	DN2WR1AC 2.2E+00	9.0E+00	1.05E+01	pCi/L	100.00%	4.62 Ę +01	0.0E+00	83.63%	11/16/00 12:51	0.2	L	LSC6	RICHRC5022

Comments:

Severn Trent Laboratories, Inc SAMPLE ANALYSIS REQUISITION

SDL 15889

STL Richland NEED ANALYTICAL REPORT BY LABORATORY: 2800 George Washington Way 11/20/00 Richland WA 99352-1613,W ATTN: LAB PURCHASE ORDER: SR027163 CLIENT CODE: 378644 PROJECT MANAGER: Ron Martino NUMBER OF SAMPLES IN LOT: 0000 SAMPLE I.D. SAMPLING DATE ANALYSIS REQUIRED F0J240212-001 10/19/00 Carbon-14 by Liquid Scint DNNCG-1-AD) METHOD: C-14 by LSC F0J240212-002 10/19/00 Carbon-14 by Liquid Scint DNNCL-1-AD (RC14) METHOD: C-14 by LSC D DETECTION LIMIT AND ANALYSIS DATE INCLUDED IN REPORT. SHIPPING METHOD: AIREBORNE DATE: 10/24/00 SEND REPORT TO: RON MARTINO SAMPLE RECEIVED BY: PLEASE SEND A SIGNED COPY OF THIS FORM WITH REPORT AT COMPLETION OF ANALYSIS. THANK YOU. STL St. Louis INT: 10/24/00 14:09:50 STL Richland 2800 George Washington Way Richland WA 99352-1613,W

RELINQUISHED BY: DATE/TIME: 10.24.00 15:30

RECEIVED FOR LAB BY: DATE/TIME:

PLEASE RETURN ORIGINAL SAMPLE ANALYSIS REQUISITION

APPENDIX B FINAL STATUS SURVEY REPORT

Final Report: Final Status Survey of St. Albans Veterans Administration Extended Care Center Facility – Queens, New York

Prepared for:

Stone and Webster

100 Technology Drive Center

Stoughton, Massachusetts 02072

Prepared by:

Cabrera Services, Inc. 809 Main Street E. Hartford, CT 06108

January 2003

Executive Summary

Cabrera Services, Inc. (CABRERA), under contract to Stone and Webster Engineering Corporation, performed final status surveys on portions of the St. Albans Veterans Administration Extended Care Center Facility (VAECC), located in Queens, New York. CABRERA also provided daily radiological support services during the field remediation phase of the project. The Final Status Survey (FSS) was performed in accordance with guidance as outlined in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and Stone and Webster documents "Work Plan for Decontamination and Decommissioning" and "Sampling and Analysis Plan for Decontamination and Decommissioning."

The VAECC facility was operated as a Naval Hospital providing nuclear medicine services under an NRC license until 1973. The affected area of the facility has been locked and inactive since radioactive contamination in excess of NRC release criteria was found by previous surveys. The radionuclide of concern (ROC) at the site is strontium-90 (Sr-90).

A FSS was performed in accordance with MARSSIM and approved Stone and Webster Work Plans. The Derived Concentration Guideline Level (DCGL) for Sr-90, established by WESTON for the U.S. Department of the Army, New England District, Corps of Engineers, was 8,700 dpm/100 cm² for concrete surfaces remaining in place (MADONIA). In addition, a soil contamination DCGL limit was set at 11 pCi/g using RESRAD with the review and approval of the US NRCto address potential contamination surrounding removed drainage piping.

The FSS consisted of scans using a beta scintillator, static measurements at discrete locations, transferable contamination measurements at the same discrete locations, and collection and analysis of soil samples from areas adjacent to locations where piping was removed and soil was exposed. Scan surveys were provided for 100% of reasonably accessible floor areas and wall areas up to a height of 2 meters.

The results of the FSS show Sr-90 residual activity may be present This FSS conclude that Sr-90 activity levels are well below the respective DCGL of 8,700 dpm/100 cm² of total and 870 dpm/100 cm² of transferable activity on the walls and floors of affected areas at the site. Soil sample results also establish that residual Sr-90 concentration in affected site soils are well below the respective DCGL of 11 pCi/g. The DCGLs presented above meet the requirements of 10CFR20 Subpart E regulation dose requirements which limit dose to an average member of the critical group to 25 millirem in any one year.

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Appendix F: Operating Procedures

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation

Definition

DCGL Derived Concentration Guideline

DOD Department of Defense

DQO Data Quality Objectives

EPA Environmental Protection Agency

FSS Final Status Survey

HSA Historical Site Assessment

LBGR Lower Bound Gray Region

MARSSIM Multi-Agency Radiation Survey and Site Investigation Manual

MDC Minimum Detectable Concentration

NRC Nuclear Regulatory Commission

ROC Radionuclides of Concern

SSHP Site Safety and Health Plan

SU Survey Unit

TLD Thermo Luminescent Dosimeter

VAECC St. Albans Veterans Administration Extended Care Center

Facility

1.0 INTRODUCTION

This report presents the results of radiological surveys that were conducted in accordance with the Work Plan and provides an analysis of the final status survey data using Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) statistical tests and guidance. Final status survey results are presented in Section 6.0.

2.0 BACKGROUND AND SITE DESCRIPTION.

The Veteran's Administration Extended Care Center (VAECC) facility is a fifteen building complex located on approximately a 55-acre site at 179th Street and Linden Boulevard in Queens, New York. Only Building 90 and Tunnel 45, which connects the subsurface levels of Building 90 to Building 91, have been impacted by the D&D activities.

The VAECC facility was operated as a Naval Hospital prior to its acquisition by the Veteran's Administration (VA). The Naval Hospital provided nuclear medicine services under a NRC license, which included several amendments. NRC licensed activities ended with the termination of Nuclear Regulatory Commission (NRC) license # 31-00076-06 on December 31, 1973. In 1976, the St. Albans facility was transferred from the Navy to the VA. The VA did not hold a radioactive materials license at the St. Albans facility. In May of 1992 the USACE, while performing a review of former Department of Defense (DOD) sites, visited the St. Albans facility and identified areas of elevated radioactivity. In July of 1992, Teledyne Isotopes performed survey work at the St. Albans facility and recommended an expanded survey and decontamination of other rooms in the report titled "Radiation Safety Survey for VA Medical Center Queens, NY, July 1992" (Teledyne Isotopes, 1992). In September 1997, Ogden Environmental and Energy Services Co., Inc, (Ogden) surveyed the nuclear labs and the ejector pit located adjacent to Tunnel 45 and identified radioactive contamination in excess of NRC release criteria in effect at that time (NEA). The Ogden report concluded the scope of the survey needed to be expanded.

Stone & Webster prepared a records review report (HSA, 1998) for the USACE, chronicling the use of radioactive materials at the St. Albans facility. The Stone & Webster report identified areas in Buildings 64, 90 and 91, which needed to be characterized and remediated to support unrestricted use of the St. Albans facility.

In 1999, Roy F. Weston Company, Inc. (Weston), conducted characterization surveys of Buildings 64, 90 and 91 (Weston, 1999a). Previous characterization of the buildings divided areas into logical survey units (SU). Based on the previous characterization efforts and small-scale decontamination activities, data demonstrate that all SUs in Buildings 64 and 91 (Weston, 1999b) met the DCGL criteria for the FSS. The Weston surveys included Carbon 14, Tritium and Strontium as radionuclides of concern. The 1999 radiological surveys conducted by Weston concluded that Carbon 14 and Tritium were not present and that strontium 90 is the only identified isotope of concern remaining at St. Albans. The Women's Bathroom (SU003) on the basement floor and the ground floor (SU008) of Building 90 met the requirements for the FSS. SUs 001, 002 and 004 (located in the Building 90 basement) contained contamination that required remediation, followed by a comprehensive FSS (Weston, 1999b).

Table 2-1
Survey Unit Summary

SURVEY UNIT#	DESCRIPTION	MARSSIM CLASS	DECON- TAMINATION REQUIRED	FINAL STATUS SURVEY COMPLETE
SU 001A	Nuclear Medicine Laboratory (High and Low Level Lab)	CLASS 1	Y	Y
SU 001B	Nuclear Medicine Laboratory (Corridor and Count Room)	CLASS 1	Y	Y
SU 002	Ejector Pit	CLASS 1	Y	Y
SU004	Men's Toilet	CLASS 1	Y	Y
SU005	Basement Level Building 90	CLASS 2	N	Y
SU 008A	Ground Level Building 90 (RMA Storage)	CLASS 2	N	Y
SU 008B	Ground Level Building 90	CLASS 3	. N	Y

Table 2-2
Survey Units Surveyed by Weston

SURVEY UNIT	DESCRIPTION	MARSSIM CLASS	DECON- TAMINATION REQUIRED	FINAL STATUS SURVEY COMPLETE
SU 003	Womens Toilet	Class 1	No	Yes
SU 006	Maintenance Shop and Stairwell	Class 3	No	Yes
SU 007	Audiology, Speech Pathology	Class 3	. No	Yes
*SU 008	Ground Level Building 90	Class 3	No	No
**SU 005	Balance of Basement in Building 90	Class 1	Sub-unit 501did not meet DCGL	No
SU 009	Incinerator	Class 3	No	Yes

^{*}Area used to transport contaminated materials must be surveyed following remediation. See Table 2-1 above.

3.0 RADIONUCLIDE OF CONCERN (ROC)

The historical review of past radiological usage and radiological survey reports indicate that Strontium-90 (Sr-90) is the only isotope of concern. Sr-90 is typically present in metallic or oxide forms. It has a half-life of approximately 28 years and is a beta source. It is both a skin- and internal-dose hazard. The Site Health and Safety Plan (SSHP) provides for measures to mitigate radiological hazards.

4.0 REMEDIATION ACTIVITIES

Prior to remediation, SU001, SU002 and SU004 at the VAECC had been found to contain residual levels of Sr-90 greater than the derived concentration guideline level (DCGL) as stated in Section 5.1. These areas have undergone remediation and subsequent Final Status Survey (FSS). Pipes in SU005 were removed during remediation activities and a FSS of SU005 was subsequently performed. For the most part, remediation activities occurred prior

^{**} SU 005 reported in sub-units - Complete details in Weston 12/99

to the FSS; however, after the bulk of remediation activities were performed, additional remediation of several small areas occurred based upon scan results. Remediation did occur on a small scale in some areas while final status survey continued. As areas were remediated and the FSS began, remediation was started in other nearby areas. Control and surveillance measures were adopted to avoid the potential of cross-contamination between FSS and remediation areas. Such control and surveillance measures during remediation activities included plastic sheeting placed over walls and entry points in each room being remediated, where necessary, and a HEPA filtered air monitoring system, which provided a negative pressure atmosphere inside each room. Results of smear surveys performed during remediation activities showed no activity in excess of background. Results of external monitoring, performed using thermo luminescent dosimetry (TLDs), showed no detectable activity for shallow and extremity doses for each worker.

Total surface Sr-90 contamination monitoring was performed with a Ludlum 2224 scaler/rate —meter with Ludlum Model 43-89 alpha-beta scintillator in accordance with standard operating procedures as presented in Appendix A of the Site Safety and Health Plan (SSHP), the Radiation Protection Plan (RPP). Removable Sr-90 contamination smears were analyzed with a Ludlum Model 2929 and Model 43-10-1 sample counter.

Remedial activities were performed in order to reduce contamination to a small fraction of the 8,700 dpm/100 cm² total DCGL and 870 dpm/100 cm² transferable contamination DCGL as follows:

In SU001, mastic was sampled for asbestos content; all debris and remaining furniture were removed; contaminated concrete was removed; remaining ductwork was removed; contaminated drain lines and soil were removed; and contaminated asbestos tile in Corridor 15 was removed.

In SU002, contaminated hardware was removed; contaminated drain lines and soil were removed; the pipe under Tunnel 45 was removed; and the contaminated drain line connecting SU001 and SU002 was removed.

In SU004, the internal contents of restroom were removed and contaminated ceramic floor tiles were removed.

Materials removed during the remediation process were surveyed and segregated as necessary to ensure that materials with levels of radioactivity greater than 200 dpm/100 cm² removable activity or 1,000 dpm/100 cm² (as per NRC Regulatory Guide 1.86) were treated as contaminated waste.

5.0 FINAL STATUS SURVEY DESIGN

The FSS of the VAECC was designed and performed using MARSSIM guidance. The radionuclide of concern is Sr-90, which emits beta radiation upon undergoing radioactive decay. Contamination in the building was assumed to be at or near the surface of walls, floors and penetrations. During remediation activities, contamination penetrated some surfaces up to several centimeters. Surface scans were performed with the knowledge that residual contamination would be greatest at the outermost layers of affected surfaces. Soil below floor structures (e.g., pipes) removed during remedial activities was considered potentially contaminated and soil samples were collected at these locals for offsite laboratory Sr-90 analysis.

Radiologically impacted areas at the VAECC were divided into four Class 1 survey units (SUs 001A, 001B, 002 and 004), two Class 2 survey units (SUs 005 and 008A), and one Class 3 survey unit (SU008B). Sr-90 surface scans were performed over reasonable accessible floor areas and wall areas up to a height of 2 meters. For the purpose of this report, the phrase "reasonable accessible" is defined to mean areas not requiring disassembly of fixed items that are not being removed and in which a Ludlum 43-89 probe could fit. SU008A was originally specified as a Class 3 survey, however, scoping surveys presented data, which supported a reclassification of SU008A as a Class 2 survey unit. The methods used for selection of survey unit areas and relevant calculations (e.g., number of sample points, grid spacing) are described in Section 5.2.

Following remediation, surface scans were performed at a speed of 1 to 3 inches per second over 100% of reasonably accessible areas of the floor and of walls up to 2 meters above the floor in each survey unit. Results were recorded and locations exceeding investigation levels stated in Section 5.1 were reported to management (i.e., Stone & Webster), investigated, and, when appropriate, remediated further. Following any additional decontamination, scanning was repeated to demonstrate effectiveness of the removal actions. A scoping survey scan of some remaining areas (i.e., upper wall and ceiling) in Class 1 and certain Class 2 areas was also performed. Scan minimum detectable concentrations (Scan MDCs) are reported in Appendix C to this report.

Following surface scanning, static 1-minute measurements were performed for at least 14 systematic, pre-determined points per survey unit and recorded by the surveyor. Scans and static measurements were performed using a Ludlum Model 2221 (or Ludlum Model 2224) scaler/ratemeter coupled to a Ludlum 43-89 probe. Shielded measurements were performed by placing the detector against a wooden jig equal in length and width to the face of the detector. The wooden jig has a low background activity allowing for conservative final activity results to be reported. This shielded measurement provides a gamma background correction for the calculation of Sr-90 surface activity concentrations. It should be noted that the structures being surveyed, especially wall surveys, varied in material consistency and, therefore, in background beta activity. Since no beta surface corrections or background subtraction due to the naturally occurring beta components of the material being scanned were made, the resultant scan and static measurements are conservative. Equations for static measurement MDC calculations are reported in Appendix D to this report.

A smear survey was also performed at each static measurement point for transferable activity analysis. A Ludlum Model 2929/43-10-1 alpha/beta sample counter was used on-site to analyze smear activity. Scan and smear counting instrumentation was efficiency calibrated using a Sr-90 NIST traceable source with results reported in disintegrations per minute of Sr-90 per 100 cm².

5.1 DCGLs Established

The DCGLs for the St. Albans facility were established using the 64132 Federal Register Notice, Volume 63, No. 222, dated November 18, 1998. Weston incorporated an alteration to the DCGLs in a letter to the USACE dated May 15, 2000 and subsequently approved by the NRC in a letter to the VA dated June 20, 2000 (MADONIA). The building surface contamination investigation level presented in Table 5-1 was set by management at the onset of field activities. Table 3-1 summarizes these DCGLs.

Table 5-1 DCGLs to be Applied at VAECC

#sotope	- Soil DCGL	Building Surface i (total activity)**	Building Synface Fransferable	Bullding Surface (total activity)
	_:tpCl/p7***;	(dpm/100/cm ²)*	Activity D. O.L.	renom/100 cm
Sr- 90	11	8,700	870	2,000

^{*}dpm/100 cm²—disintegrations per minute per one hundred square centimeters

5.2 Final Status Survey Unit Classification and Calculations

A site reference coordinate system was designed to ensure all sample and measurement locations are spatially identified such that each location is reliably reproducible. Computer assisted design (CAD) was utilized to layout survey unit dimensions by rooms and to aid in the development of the FSS locations. The individual survey units were broken down based upon logical room units and initial levels of contamination.

5.2.1 Survey Unit Classification

Survey units in impacted areas under MARSSIM are broken into three classes (i.e., Class 1, 2 and 3). Impacted areas at the VAECC were divided into four Class 1 survey units (SU001A, 001B, 002 and 004), two Class 2 survey units (SU005 and 008A), and one Class 3 survey unit (SU008B). SU008A was originally specified as a Class 3 survey, however, early scoping

^{**} total activity = Gross activity

^{***}pCi/g—Picocurie per gram

surveys presented data, which supported a reclassification of SU008A as a Class 2 survey unit. A triangular grid pattern was chosen for each survey unit.

An area is classified as a Class 1 survey unit if contaminant concentrations exist above the DCGLs. Past data indicates that SU001, 002 and 004 meet this criterion and therefore these areas have been designated as Class 1 survey units. The suggested maximum survey unit size for a Class 1 survey unit is 100 m². Therefore, due to the size of SU001, it has been divided into two survey units, SU001A and SU001B.

Sampling Survey Unit Maps are presented in Appendix B to this report.

5.2.2 Survey Reference System

A reference coordinate system was used to provide a level of reproducibility consistent with the objective of the survey. A random-start triangular grid pattern was referenced to each survey unit, a random starting point selected and the starting point grid coordinates of all locations within the survey unit were identified.

5.2.3 Limits on Decision Errors

Decisions based on survey results can often be reduced to a choice between "yes" or "no," such as evaluating whether or not a survey unit meets the release criterion. When viewed in this way, two types of incorrect decisions, or decision errors, are identified:

- Type I incorrectly deciding that the answer is "yes" when the true answer is "no,"
- Type II incorrectly deciding the answer is "no" when the true answer is "yes."

The distinctions between these two types of errors are important for two reasons: (1) the consequences of making one type of error versus the other may be very different, and (2) the methods for controlling these errors are different and involve tradeoffs. For these reasons, the decision maker should specify acceptable levels for each type of decision error.

A Type I decision error occurs when the null hypothesis is rejected when it is true, and is sometimes referred to as a false positive error. The probability of making a Type I decision error, or the level of significance, is denoted by alpha (α) . Alpha reflects the amount of evidence the decision maker would like to see before abandoning the null hypothesis, and is also referred to as the *size* of the test.

A Type II decision error occurs when the null hypothesis is accepted when it is false. This is sometimes referred to as a false negative error. The probability of making a Type II decision error is denoted by beta (β) . The term $(1-\beta)$ is the probability of rejecting the null hypothesis when it is false, and is also referred to as the *power* of the test.

Using MARSSIM, the following limits on α and β have been established:



- Type I error $\alpha = 0.05$. This implies that 5 percent (%) of the time the SU could be released even if the release criterion is exceeded. (Results in small but increased risk to the public.)
- Type II error β = 0.05. This implies that 5% of the time even though the release criterion is not exceeded the SU will fail. (Results in unnecessary cleanup cost.)

5.2.4 Estimation of Relative Shift

The Lower Bound of the Gray Region (LBGR) is selected during the DQO process along with the target values for α and β . The width of the gray region, equal to (DCGL - LBGR), is a parameter that is central to the nonparametric tests discussed in MARSSIM. It is also referred to as the shift, Δ . The absolute size of the shift is actually of less importance than the relative shift - Δ/σ , where σ is an estimate of the standard deviation of the measured values in the survey unit. The estimated standard deviation, σ , includes both the real spatial variability in the quantity being measured, and the precision of the chosen measurement method. The relative shift, Δ/σ , is an expression of the resolution of the measurements in units of measurement uncertainty. Expressed in this way, it is easy to see that relative shifts of less than one standard deviation, $\Delta/\sigma < 1$, will be difficult to detect. On the other hand, relative shifts of more than three standard deviations, $\Delta/\sigma > 3$, are generally easier to detect. The number of measurements that will be required to achieve given error rates, α and β , depends almost entirely on the value of Δ/σ .

The minimum number of sample locations required is dependent on the distribution of site residual radionuclide concentrations relative to the DCGL and acceptable decision error limits (α and β), which are established in the previous section. The relative shift describes the relationship of site residual radionuclide concentrations to the DCGL and is calculated using the following equation, from MARSSIM.

$$\Delta / \sigma = \frac{DCGL - LBGR}{\sigma}$$

Where: DCGL = the derived concentration guideline (i.e., release limit)

LBGR = concentration at the lower bound of the gray region. The LBGR is the concentration to which the survey unit must be cleaned in order to have an acceptable probability of passing the statistical tests. The LBGR effectively becomes the survey's action level.

σ = an estimate of the standard deviation of the concentration of residual radioactivity in the survey unit (which includes real spatial variability in the concentration as well as the precision of the measurement system)

For this project, an LBGR = ½ DCGL has been established. During project planning, it was assumed that, following remediation, Sr-90 residual activities would be significantly less than

the DCGL. If the assumed σ value is 1450 dpm/100cm² or less, the relative shift is calculated to be greater than 3. We will assume then that the σ value is, at most, 1450 dpm/100cm² and that the relative shift is at least 3. Following the FSS, data results will be reduced for each survey unit and with a standard deviation of less than 1450 dpm/100cm², the relative shift should calculate to greater than 3.

5.2.5 Number of Data Points

A statistical test may be used, if necessary to determine whether portions of the site are suitable for release for unrestricted use. The minimum number of systematic measurement locations required in each survey unit for the statistical test is determined using the following equation, from MARSSIM.

$$N = \frac{1}{2} \times \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{3(P_r - 0.5)^2}$$

Where: N = the minimum number of measurement locations per survey unit

 $Z_{1-\alpha}$ = the percentile represented by the decision error α (Type I)

 $Z_{1-\beta}$ = the percentile represented by the decision error β (Type II)

P_r = the probability that a random measurement from the survey unit exceeds a random measurement from the background reference area by less than the DCGL when the survey unit median is equal to the LBGR above background (based on relative shift)

The acceptable percentile values are $Z_{1-\alpha} = Z_{1-\beta} = 1.645$ (from Table 5.2 in MARSSIM). The relative shift is greater than 3, allowing the P_r value to be set at 1 as per MARSSIM, Section 5.5.2.3.

The Final Decommissioning Plan states eleven (11) data points per survey unit were required. However, based on MARRISM (Section 5.5.2.2), the number of sampling points should be increased by at least 20% in order to attain the desired power for statistical testing as well as to allow for any possible lost or unusable data points. This increased the number of data points to at least 14 points in each survey unit.

5.2.6 Additional Samples to Meet EMC Criterion

MARSSIM states that, for Class 1 areas, a dose area factor must also be used to evaluate the magnitude by which the concentration within a small area of elevated activity can exceed the DCGL_w while maintaining compliance with the release criterion. The following formula is listed in section 5.5.2.4 of MARSSIM for determining the necessary scan sensitivity when incorporating the area factor:

Scan MDC (required) = (DCGL_w) x (Area Factor)

If the actual scan MDC is greater than the required scan MDC, additional samples are required to ensure that the dose-based criterion is satisfied.

The area factor is determined based on specific regulatory agency guidance and is some value greater than one. The calculated Scan MDC as presented in Appendix C for the plastic scintillator detector in use at the VAECC is 788 dpm/100 cm² for concrete material and 839 dpm/100 cm² for brick material. These values are well below the DCGL of 8,700 dpm/100 cm². An additional area factor multiplier would only increase required Scan MDC value. As such, the number of at least 14 samples per survey unit established in the previous section will suffice and no additional samples are required to meet the EMC criterion.

5.2.7 Grid Spacing

The grid spacing for the triangular grid is estimated as follows:

$$L = \sqrt{\frac{A}{0.866 \times n}}$$

Where: A = the surface area in the survey unit, and

n = the number of sample points per survey unit

The calculated L value for each survey unit is presented on Attachment 1 to this report.

5.3 Instrument Selection and Survey Techniques

Radiological instruments were available to scan equipment, personnel, and clothing for radiological contamination and for performing the FSS. This equipment included Geiger-Mueller detectors, beta scintillation probes, smear sample counter, a microrem meter, and other instrumentation connected to appropriate rate/scaler meters.

Scans were performed at a speed of 1 to 3 inches per second. General instrumentation survey techniques are presented in the operating procedures, which are attached as Appendix F to this report.

5.3.1 Field Instruments

A Ludlum Model 177 coupled to Ludlum Model 44-9 alpha/beta/gamma probe was used to radiologically release equipment and materials.

Ludlum Model 9 and Ludlum Model 19 meters were used to survey exposure levels at the VAECC.

A Ludlum Model 2221 scaler/ratemeter coupled to a Ludlum Model 43-89 alpha/beta scintillator probe and a Ludlum Model 2224 scaler/ratemeter coupled to a Ludlum 43-89 alpha/beta scintillator probe were used for performing surface scans.

The 4-inch cast iron pipe in the ejector pit was characterized using an AEES, Inc. PSR-4 proportional probe gas flow detector. The PSR-4 is designed to navigate multiple 90° pipe bends and traverse internal welds while maintaining a centered position. The probe utilizes P-10 gas fed through a C series combination gas and high voltage cable. The detector is covered with a single wrap of 0.8 mg/cm² mylar.

The PSR-4 (screened, ruggedized) probe uses a screen to minimize mylar window damage, and large spring-loaded rollers to guide and center the probe within the pipe. The large rollers allow for near zero insertion force while pushing the detector through the pipe. A plumber's flat snake with four-inch measurements was used to push the PSR-4 while measuring the location of the detector within the pipe. The instrument used to provide characterization data for the cast iron pipe is a detector appropriate for the energy and type of radiation to be detected. In addition, the instrument response and MDC is low enough to provide reasonable assurance that the established DCGLs levels may be achieved in the field.

The MDC expression from Table 3-1 of NUREG-1507 "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions", December 1997, based on 95 % confidence, and 1-minute count and background time is:

$$MDC = C \times \left(3 + 4.65\sqrt{B}\right)$$

Where,

C = Detector Efficiency, dpm/count

B = Background Count - 1 Minute, counts

The following table provides calculated MDCs for several background values assuming the manufacturer's efficiency of 6% for 90 Sr/ 90 Y.

Radionuclide	Manufacturer's Detector Efficiency, (DPM/CPM)	Background, (CPM)	MDC Result (DPM/100cm²)
`Sr-90/Y-90	16.67	100	825
Sr-90/Y-90	16.67	150	999
Sr-90/Y-90	16.67	200	1146
Sr-90/Y-90	16.67	250	1275

5.3.2 Smear/Air Counting Instruments

A Ludlum Model 2929/43-10-1 alpha/beta sample counter was used to perform analysis of smear and air samples.

5.3.3 Environmental Air Sampling

A LV-1 low volume air sampler coupled to an isokinetic nozzle was used for airborne particulate measurements being discharged to the environment. All ventilation air discharged to the environment passed through a HEPA filtration system for essentially 100% total particulate capture. No gas or vapor releases were caused during the remediation process.

5.4 Instrument Calibration

Current calibration records were kept on site for review and inspection (included as Appendix G to this report). The records include, at a minimum, the following:

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

Instrumentation was maintained and calibrated to manufacturers' specifications to ensure that required traceability, sensitivity, accuracy and precision of the equipment/instruments were maintained. Instruments were calibrated at a facility possessing appropriate NRC and/or Agreement State licenses for performing calibrations using National Institutes of Standard Technology (NIST) traceable sources. Scanning and smear counting instrumentation were efficiency calibrated using a Sr-90 NIST traceable source. Daily source checks were performed for all radiological survey instrumentation used at the VAECC. Control charts and relevant data are presented in Appendix E to this report.

5.5 Operating Procedures

Standard operating procedures for radiological survey instrumentation are referenced in Section 5.3 of this report. Other operating procedures can be found in Appendix F to this report.

6.0 SURVEY RESULTS

6.1 Survey Unit 001A

A Class 1 Final Status Survey was performed in Survey Unit 001A. Following are the 100% direct scan results, the direct static measurement results, and the results of any smear surveys taken in Survey Unit 001A.

6.1.1 Direct 100% Scan Results

A direct beta scan survey was performed in Survey Unit 001A on 100% of reasonably accessible floor areas and wall areas up to a height of 2 meters. Residual activity was identified at levels above background. Based on the beta scan results, the highest residual activity identified in Survey Unit 001A was approximately 2,700 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.1.2 Direct Static Measurement Results

Direct static measurements of Sr-90 surface contamination results for Survey Unit 001A ranged from 75 to 406 dpm/100 cm². These results are well below the release limit of 8,700 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.1.3 Smear Survey Results

Transferable surface contamination results for Survey Unit 001A range from 0 to 36 dpm/100 cm². These results are below the transferable contamination release limit of 870 dpm/100 cm² (i.e., 10% of the 8,700 dpm/100 cm² release limit). Survey results are presented in Appendix A for reference.

6.2 Survey Unit 001B

A Class 1 Final Status Survey was performed in Survey Unit 001B. Following are the 100% direct scan results, the direct static measurement results, and the results of any smear surveys taken in Survey Unit 001B.

6.2.1 Direct 100% Scan Results

A direct beta scan survey was performed in Survey Unit 001B on 100% of reasonably accessible floor areas and wall areas up to a height of 2 meters. Residual activity was identified at levels above background. Based on the beta scan results, the highest residual activity identified in Survey Unit 001B was approximately 4,200 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.2.2 Direct Static Measurement Results

Direct static measurements of Sr-90 surface contamination results for Survey Unit 001B ranged from 37 to 433 dpm/100 cm². These results are well below the release limit of 8,700 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.2.3 Smear Survey Results

Transferable surface contamination results for Survey Unit 001B range from 0 to 36 dpm/100 cm². These results are below the transferable contamination release limit of 870 dpm/100 cm² (i.e., 10% of the 8,700 dpm/100 cm² release limit). Survey results are presented in Appendix A for reference.

6.3 Survey Unit 002

A Class 1 Final Status Survey was performed in Survey Unit 002. Following are the 100% direct scan results, the direct static measurement results, and the results of any smear surveys taken in Survey Unit 002.

6.3.1 Direct 100% Scan Results

A direct beta scan survey was performed in Survey Unit 002 on 100% of reasonably accessible floor areas and wall areas up to a height of 2 meters. Residual activity was identified at levels above background. Based on the beta scan results, the highest residual activity identified in Survey Unit 002 was approximately 4,800 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.3.2 Direct Static Measurement Results

Direct static measurements of Sr-90 surface contamination results for Survey Unit 002 ranged from 85 to 401 dpm/100 cm². These results are well below the release limit of 8,700 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.3.3 Smear Survey Results

Transferable surface contamination results for Survey Unit 002 range from 0 to 45 dpm/100 cm². These results are below the transferable contamination release limit of 870 dpm/100 cm² (i.e., 10% of the 8,700 dpm/100 cm² release limit). Survey results are presented in Appendix A for reference.

6.4 Survey Unit 004

A Class 1 Final Status Survey was performed in Survey Unit 004. Following are the 100% direct scan results, the direct static measurement results, and the results of any smear surveys taken in Survey Unit 004.

6.4.1 Direct 100% Scan Results

A direct beta scan survey was performed in Survey Unit 004 on 100% of reasonably accessible floor areas and wall areas up to a height of 2 meters. Residual activity was identified at levels above background. Based on the beta scan results, the highest residual activity identified in Survey Unit 004 was approximately 2,200 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.4.2 Direct Static Measurement Results

Direct static measurements of Sr-90 surface contamination results for Survey Unit 004 ranged from 64 to 1,223 dpm/100 cm². These results are well below the release limit of 8,700 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.4.3 Smear Survey Results

Transferable surface contamination results for Survey Unit 004 range from 0 to 27 dpm/100 cm². These results are below the transferable contamination release limit of 870 dpm/100 cm² (i.e., 10% of the 8,700 dpm/100 cm² release limit). Survey results are presented in Appendix A for reference.

6.5 Survey Unit 005

A Class 2 Final Status Survey was performed in Survey Unit 005. Following are the 100% direct scan results, the direct static measurement results, and the results of any smear surveys taken in Survey Unit 005.

6.5.1 Direct 100% Scan Results

A direct beta scan survey was performed in Survey Unit 005 on 100% of reasonably accessible floor areas and wall areas up to a height of 2 meters. Residual activity was identified at levels above background. Based on the beta scan results, the highest residual activity identified in Survey Unit 005 was approximately 1,200 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.5.2 Direct Static Measurement Results

Direct static measurements of Sr-90 surface contamination results for Survey Unit 005 ranged from 21 to 1,661 dpm/100 cm². These results are well below the release limit of 8,700 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.5.3 Smear Survey Results

Transferable surface contamination results for Survey Unit 005 range from 0 to 44 dpm/100 cm². These results are below the transferable contamination release limit of 870 dpm/100 cm² (i.e., 10% of the 8,700 dpm/100 cm² release limit). Survey results are presented in Appendix A for reference.

6.6 Survey Unit 008A

Due to initial scoping results, Survey Unit 008A was reclassified in the field to a Class 2 survey unit and subsequently surveyed as a Class 2 survey unit. Following are the 100% direct scan results, the direct static measurement results, and the results of any smear surveys taken in Survey Unit 008B.

6.6.1 Direct 100% Scan Results

A direct beta scan survey was performed in Survey Unit 008A on 100% of reasonably accessible floor areas and wall areas up to a height of 2 meters. Residual activity was identified at levels above background. Based on the beta scan results, the highest residual activity identified in Survey Unit 008A was approximately 4,000 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.6.2 Direct Static Measurement Results

Direct static measurements of Sr-90 surface contamination results for Survey Unit 008A ranged from 150 to 3,884 dpm/100 cm². These results are well below the release limit of 8,700 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.6.3 Smear Survey Results

Transferable surface contamination results for Survey Unit 008A range from 0 to 29 dpm/100 cm². These results are below the transferable contamination release limit of 870 dpm/100 cm² (i.e., 10% of the 8,700 dpm/100 cm² release limit). Survey results are presented in Appendix A for reference.

6.7 Survey Unit 008B

A Class 3 Final Status Survey was performed in Survey Unit 008B. Following are the 100% direct scan results, the direct static measurement results, and the results of any smear surveys taken in Survey Unit 008B.

6.7.1 Direct 100% Scan Results

A direct beta scan survey was performed in Survey Unit 008B on 100% of reasonably accessible floor areas and wall areas up to a height of 2 meters. Residual activity was not identified at levels significantly above background. Survey results are presented in Appendix A for reference.

6.7.2 Direct Static Measurement Results

Direct static measurements of Sr-90 surface contamination results for Survey Unit 008B ranged from 35 to 165 dpm/100 cm². These results are well below the release limit of 8,700 dpm/100 cm². Survey results are presented in Appendix A for reference.

6.7.3 Smear Survey Results

Transferable surface contamination results for Survey Unit 008B range from 0 to 13 dpm/100 cm². These results are below the transferable contamination release limit of 870 dpm/100 cm² (i.e., 10% of the 8,700 dpm/100 cm² release limit). Survey results are presented in Appendix A for reference.

6.8 Soil Analysis Survey Results

Soil samples were collected from pipe trench areas where cast iron and stainless steel piping was removed in Survey Units 001A, 001B and 005. Locations were selected for soil sampling based on proximity to pipe connection points or other potential leakage points and as per Stone & Webster guidance. In these three survey units, a potential existed for the migration of Sr-90 contamination into soil due to the cutting and removal operation of potentially contaminated pipes. The collected soil samples were sent to an off-site laboratory for Sr-90 concentration analysis. The DCGL in soil for Sr-90 is 11 pCi/g as referenced in Section 5.1. A map of soil sample locations is presented in Appendix B.

6.8.1 Survey Unit 001A Soil sample Results

Reported soil sample concentrations of Sr-90 in Survey Unit 001A range from 0.05 ± 0.39 pCi/g (MDC of 0.67 pCi/g) to 6.81 ± 0.89 pCi/g (MDC of 0.60 pCi/g). These results are well below the DCGL of 11.0 pCi/g. Soil sample results are presented in Appendix A for reference.

6.8.2 Survey Unit 001B Soil sample Results

Reported soil sample concentrations of Sr-90 in Survey Unit 001B range from 0.05 ± 0.41 pCi/g (MDC of 0.71 pCi/g) to 6.60 ± 1.40 pCi/g (MDC of 0.60 pCi/g). These results are well below the DCGL of 11.0 pCi/g. Soil sample results are presented in Appendix A for reference.

6.8.3 Survey Unit 005 Soil sample Results

Reported soil sample concentrations of Sr-90 in Survey Unit 005 range from -0.02 ± 0.35 pCi/g (MDC of 0.62 pCi/g) to 0.47 \pm 0.40 pCi/g (MDC of 0.65 pCi/g). These results are well below the DCGL of 11.0 pCi/g. Soil sample results are presented in Appendix A for reference.

6.9 Surveys in Ejector Pit Room & Drum Storage

Work was performed in the Ejector Pit Room to measure the contamination levels inside the four-inch cast iron pipe in the wall. The work area was set-up to minimize the spread of contamination on the walls and floor. Smear surveys performed after the completion of work showed all levels to be at or below background. (See Table 7.9) Also, the four radioactive waste drums kept in the closet on the top level were removed from this area and placed on a herculite lay-down area. These drums were awaiting truck transport to a disposal site. A



direct frisk of the drum storage and lay-down areas indicated no smearable contamination levels after these drums were removed from the building. (See Table 7.8)

6.10 Ejector Pit Cast Iron Pipe Characterization

This pipe is in the concrete wall of the ejector pit room. The pipe is located approximately 9 feet above the lower floor elevation in the ejector pit room on the wall opposite the room entrance. The pipe travels underground to an outside storm sewer manhole approximately 100 feet from building 90. Activities associated with the 4-inch cast iron pipe are limited to characterization of the internal surfaces of the pipe. No radioactive material was intentionally removed from the cast iron pipe inner surfaces and no volumetric samples were collected.

Based upon probe and pipe geometry, the PSR-4 probe field of view is 3.75 inches of interior pipe surface. The total interior pipe surface area is: $\pi \times 4^{\circ} \times 2.54$ cm/in $\times 3.75^{\circ} \times 2.54$ cm/in

The presence of naturally occurring radon/thoron radioactivity caused much more difficulty than anticipated in trying to acquire accurate readings using the PSR-4 probe. Readings in the ejector pit area as well as in an office room in another building found radon/thoron levels to be in the range of 8000 cpm - 10,000 cpm. The combination of concrete walls and floors together with the PSR-4's thin mylar window are significant factors in these high background values. Before conducting pipe readings, the PSR-4 was taken outside to allow for "natural purging" of the detector. The count data in Attachment B describe the background readings at specific times. A significant decrease is seen from the reading @ 1240 hrs (6099 cpm) versus the value @ 1315 hrs (3051 cpm). This is a result of the probe being in the cast iron pipe and not in the ambient atmosphere where the high readings were detected.

Note: After the characterization survey was completed, the PSR-4 detector was sent back to the vendor. The vendor stated that the probe was working properly.

Survey Technique

The instrument used in the pipe characterization was calibrated to a ⁹⁰Sr source of known strength in geometry similar to the expected probe positioning within the cast iron pipe. The probe was setup in accordance with the manufacturer instructions and guidance (See Attachment C).

One-minute instrument readings were taken every 4 inches using a Ludlum 2221 scaler/ratemeter utilized in integrate mode. Four inches is consistent with the approximate field of view of the probe within the cast iron pipe. Count times were chosen to assure MDC and desired sensitivity is achieved. Results were converted to the same measurement units as the site DCGL (dpm/100cm²).

Provisions were made to measure up to fifty feet of pipe. However, several 45-degree bends and possible internal obstructions prevented measurements of the full pipe length. The total length of pipe characterized was about 20 feet from the point of entry. At selected distances, duplicate readings were taken to determine consistency of measurements.

PSR-4/LUdlum 2221 count data

Attachment B shows the one-minute gross count data using the PSR-4/Ludlum 2221 arrangement. For Instrument readings No. 1 & 2, the net count results are computed by subtracting 6099 (background value @ 1240 hrs.) from the gross count value. For Instrument readings No. 3 thru No. 8, the net counts are computed by subtracting 3537 (background value @ 1' mark) from the gross count value. For the remaining instrument readings, the net counts are determined by subtracting 3051 (background value @ 3' mark) from the gross count value. The background readings were very high during the initial measurement process due to the concentration of natural radon/thoron daughters. An attempt was made to reduce this concentration by locating fans in the ejector pit area. However, use of this engineering control was marginally successful in reducing radon/thoron concentrations.

Duplicate readings were taken at Instrument Reading No.'s 3, 4, 9 and 36 (last four readings in Attachment B). Good correlation is noted for Readings No. 9 & 36, (985 vs. 880 and -103 vs. -103). Poor correlation is seen for the other two Readings. The poor correlation is likely due to the rapid decay in radon/thoron daughters contributing to the probe reading.

The first 45° pipe bend occurred at about six feet in. The second 45° bend was between 18.5 and 19 feet. The PSR-4 detector was removed from the pipe at this point since it could not be maneuvered any further.

Conclusion of Cast Iron Pipe Characterization

The critical value has been determined to be 2432 counts/minute value for Sr-90. All counts/minute values in Attachment B are below this number. Therefore, the contents of this cast-iron pipe do not contain radioactive material above the DCGL.

7.0 STATISTICAL EVALUATION OF FINAL STATUS SURVEY RESULTS

Statistical evaluation of final status survey data is not presented in this report due to scan, static measurement and soil sample results being well below the relevant DCGL for each result. A statistical evaluation (e.g., the Sign Test) would have been performed if some sample results were found to be greater than the relevant DCGL for each result. The ranges, averages, resulting standard deviation and relative shift calculations are included for all surface scan and static measurement results in the following tables and all results are presented in Appendix A to this report. The relative shift value with respect to FSS data results is presented for each Survey Unit at the bottom of each of the following tables. Each relative shift result is greater than 3 and, therefore, follows the assumptions made in establishing the FSS design. Previous details concerning the assumptions made for relative shift with respect to this FSS can be found in Section 5.2.4 of this report.

7.1 Data Reduction Tables

7.1.1 Table 7-1 Survey Unit 001A

	SURVEY UNIT 001A	
	DIRECT MEASUREMENT TOTAL SURFACE CONTAMINATION	TRANSFERABLE SURFACE CONTAMINATION
Sample Designation	dpm/100cm ²	dpm/100cm ²
1A-1	294	0
1A-2	208	0
1A-3	144	18
1A-4	278	0
1A-5	299	0
1A-6	176	0
1A-7	224	3
1A-8	272	36
1A-9	406	4
1A-10	304	0
1A-11	315	0
1A-12	337	0
1A-13	75	0
1A-14	128	0
1A-15	342	15
1A-16	326	. 0
Average	258	5
Standard Deviation	90	10
Relative Shift	48	434

7.1.2 Table 7-2 Survey Unit 001B

	SURVEY UNIT 001B	
	DIRECT MEASUREMENT TOTAL SURFACE CONTAMINATION	TRANSFERABLE SURFACE CONTAMINATION
Sample Designation	dpm/100cm ²	dpm/100cm ²
1B-1	433	36
1B-2	321	21
1B-3	246	1
1B-4	337	0
1B-5	203	<u> </u>
1B-6	353	0
1B-7	171	0
1B-8	208	0
1B-9	299	33
1B-10	363	0
1B-11	192	0
1B-12	278	0
1B-13	187	1
1B-14	37	0
1B-15	214	0 .
1B-16	128	6
1B-17	187	0
		•
Average	244	. 6
Standard Deviation	98	12
Relative Shift	44	366

7.1.3 Table 7-3 Survey Unit 002

. •	SURVEY UNIT 002	
	DIRECT MEASUREMENT TOTAL SURFACE CONTAMINATION	TRANSFERABLE SURFACE CONTAMINATION
Sample Designation	dpm/100cm ²	dpm/100cm ²
2-1	342	10
2-2	267	4
2-3	299	0
2-4	262	37
2-5	144	0 .
2-6	118	21
2-7	390	5
2-8	401	12
2-9	85	0
2-10	353	45
2-11	187	0
2-12	337	10
2-13	294	7
2-14	176	0
2-15	118	0
2-16	337	. O
2-17	166	26
2-18	294	13
Average	254	11
Standard Deviation	101	14
Relative Shift	43	322

7.1.4 Table 7-4 Survey Unit 004

SURVEY UNIT 004		
	DIRECT MEASUREMENT TOTAL SURFACE CONTAMINATION	TRANSFERABLE SURFACE CONTAMINATION
Sample Designation	dpm/100cm ²	dpm/100cm ²
4-1	978	0
4-2	791	8
4-3	107	0
4-4	304	0
4-5	337	0
4-6	288	27
4-7	919	8
4-8	892	0
4-9	214	0
4-10	908	0 .
4-11	1026	0
4-12	64	0
4-13	876	. 0
4-14	1223	0
Average	638	3
Standard Deviation	394	7
Relative Shift	11	588

7.1.5 Table 7-5 Survey Unit 005

SURVEY UNIT 005		
	DIRECT MEASUREMENT TOTAL SURFACE CONTAMINATION	TRANSFERABLE SURFACE CONTAMINATION
Sample Designation	dpm/100cm ²	dpm/100cm ²
5-1	1661	25
5-2	43	2
5-3	203	8
5-4	1512	44
5-5	1432	0
5-6	321	0
5-7	262	0
5-8	1186	16
5-9	1132	0
5-10	294	5 .
5-11	· 139	0
5-12	21	0
5-13	1218	0
5-14	524	0
5-15	598	7
5-16	134	6
5-17	1245	0
Average	701	7
Standard Deviation	582	12
Relative Shift	7	365

	SURVEY UNIT 008A								
	DIRECT MEASUREMENT TOTAL SURFACE CONTAMINATION	TRANSFERABLE SURFACE CONTAMINATION							
Sample Designation	dpm/100cm²	dpm/100cm ²							
8A-1	347	6							
8A-2	230	13							
· 8A-3	214	12							
8A-4	. 491	13							
8 A-5	481	22							
8A-6	491	24							
8A-7	342	8							
8A-8	3884	10							
8A-9	224	11							
8A-10	363	22							
8A-11	353	18							
8A-12	214	6							
8A-13	150	0							
8A-14	283	29							
8A-15	278	12							
Average	556	14							
Standard Deviation	927	8							
Relative Shift	5	567							

7.1.7 Table 7-7 Survey Unit 008B

SURVEY UNIT 008B							
	DIRECT MEASUREMENT TOTAL SURFACE CONTAMINATION	TRANSFERABLE SURFACE CONTAMINATION					
Sample Designation	dpm/100cm ²	dpm/100cm ²					
8B-1	72	О ,					
8B-2	115	6					
8B-3	51	0					
8B-4	3 5	0					
8B-5	78	1					
8B-6	165	0					
8B-7	49	0`					
8B-8	58	2					
8B-9	51	13					
8B-10	134	1					
8B-11	113	12					
8B-12	.126	7					
8B-13	136	0					
8B-14	103	0					
Average	92	3					
Standard Deviation	40	5					
Relative Shift	107	921					

7.1.8 Table 7.8 Survey of Drum Closet Storage Area

Sample Number	Location	Direct Scan Total Surface Contamination (dpm/100 cm²)	Removable Surface Contamination (dpm/100 cm ²)
1	Back Wall	336	10
2	Left Wall	386	0
3	Front Wall	429	0
4	Door	13	7
5	Floor	205	. 0
6	Right Wall	327	. 0

Date: July 18, 2001

Surveyor: Steve Sagaties

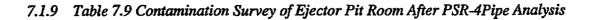
Direct Scan: Instrument Used L2224; # 162426/43-89 Scintillation Probe # 171386

Instrument Efficiency: 0.336

Removable Contamination: Instrument Used L2929; # 163827

Instrument Efficiency: 0.459

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	,		
Sample Number	Location	Direct Scan Total Surface Contamination (dpm/ 100 cm ²)	Removable Surface Contamination (dpm/ 100 cm ²)
1	Floor by Ladder	0	6
2	Center of Floor		18
3	Northwest Corner of Floor	57	0
4	Front Wall: Left		14
5	Front Wall: Under Pipe		0
6	Front Wall: Under Pipe (By Floor)	0	0

Date: July 18, 2001

Surveyor: Steve Sagaties

Direct Scan: Instrument Used L2224; #162426/ 43-89 Scintillation Probe #171386

Instrument Efficiency: 0.336

Removable Contamination: Instrument Used L2929; # 163827

Instrument Efficiency: 0.459

8.0 SUMMARY

Remediation activities performed at the VAECC sufficiently reduced Sr-90 residual contamination to levels below the relevant DCGLs as planned. As shown by the final status survey surface scan-and static measurement results, surface contamination levels of Sr-90 activity in impacted areas of Survey Units 001A, 001B, 002, 004, 005, 008A and 008B are well below the DCGL of 8,700 dpm/100 cm². As shown by the final status survey soil sample results, soil contamination levels of Sr-90 residual activity in impacted soils of Survey Units 001A, 001B and 005 are also well below the DCGL of 11 pCi/g.

References

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approved by the NRC in a letter to the VA dated June 20, 2000

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and US Department of Energy.

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Administration Extended Care Center Queens, New York.

Prepared for U.S. Army Corps of Engineers, North Atlantic
Division, New England District, by Roy F. Weston, Inc., Carle

Place New York. December 1999.

(Weston 2000) Final Decommissioning Plan St. Albans Veterans

Administration, Extended Care Center Queens, New York. Prepared for U.S. Army Corps of Engineers, North Atlantic Division, New England District, by Roy F. Weston, Inc., Carle

Place New York. July 2000.

Attachment 1:

Grid Spacing - L Values

ATTACHMENT 1

GRID SPACING

SURVEY UNIT	AREA, m²	NUMBER OF DATA POINTS, n _{EA}	GRID SPACING, L, m	ROUNDED SPACING, m
1a	82	14	2.6	2.6
1b	105	14	2.9	2.9
2	65	14	2.3	2.3
4	36	14	1.7	1.7
. 5	214	14	4.2	4.2
. 8a	187	_ 14	3.9	3.8
8b	168	14	3.7	3.5

Attachment A Determination of PSR-4 Detector Efficiency

Appendix A: Determination of PSR 4 Detector Efficiency

Instrument reading No.	1.25" diameter Sr 90 Source Center Location wrt to PSR4 center of active area @ radial distance 2.25 inches from detector axis centerline	·	Net Counts (1 Minute)	Adjustment for measured beta dose reduction with 25 mg/cm ² plastic sheeting source holder	Measured 1 minute count rate adjustment for source counts at calibration distance of 1 inch vs detector to-surface distance of 0.75 inches to inner pipe wall in		per square cm source	Total Net Counts for area within detector "field of view" on pipe inner wall of 3.75" (CPM)	Sr-90 Source DPM for equivalent of 23.75cm2 (equivalent to 3 - 1.25" diameter sources)	Efficiency, CPM/DPM
							45.65	·		
11	center	254	191.2	1.16	1.44	319	40.30			
2	1.25" left	163	100.2	1.16	1.44	167	21.12			
3	1.25" right	165	102.2	1.16	1.44	170	21.54	656.00	14232	0.046
- 4	2.5" left	72	9.2	NA	NA	NA	NA]		
5	2.5" right	74	11.2	NA	NA	NA	NA			

Background Start (CPM):	62.8
Background End (CPM):	

				Instrument:	Ludlum 2221	Calibration Du	12/26/2001
By:	H. W. Siegrist	Date:	07/05/2001	Serial No:	81301		:
Reviewed By:		Date:		Probe:	PSR-4]	•
				Serial No:	78575 16336 9]	

Attachment B PSR-4 Count Data in Cast Iron Pipe

Instrument reading No.	Probe leading edge Location from Pipe Penetration Opening, inches	Gross Counts (1 Minute)	Net counts	instrument reading No.	Probe leading edge Location from Pipe Penetration Opening, inches	Gross Counts (1 Minute)	Net counts	Instrument reading No.	Probe leading edge Location from Pipe Penetration Opening, inches	Gross Counts (1 Minute)
1	4	6173	74	51	204	2217	-834		,	
2	8	6387	288	52	208	2081	-970			
3 ·	12	5488	1951	53	212	2221	-830	·		
4	16	5325	1788	54	216	1927	-1124			
5	20	3720	· 183	55	220	2081	-970			
6	24	3421	-116	56	224	2061	-990			
7	28	3583	46	57	228				,	
. 8	32	3879	342	58	232					
8	36	4036	985	59	236					
. 10	40	4058	1007	3 (QA)	12	3833	296			
11	44	4326	1275	4 (QA)	. 16	3772	235			
12	48	4508	1457	9 (QA)	36	3931	880]		
13	52	4312	1261	36 (QA)	144	2948	-103			
14	56	4115	1064		1					
15	60	3726	675							
16	64	3988	937		i e					
17	68	3924	873							
18	72	3628	577							
19	76	4061	1010							
20	80	4315	1264							
. 21	84	4156	1105						•	
22	88	4180	1109							
23	92	4277	1226							
24	96	4106	1055			· ·		1		
25	100	3790	739							
26	104	3451	400	·						~
27	108	3725	674							
28	112	3186	135				 	1		
29	116	3083	32					 		
30	120	2978	-73		 					
31	124	3319	268		 					
32	128	3407	356		 					
33	132	3088	37		-					
34	136	3076	25		 			 		
35	140	2931	-120	 		· · · · · · · · · · · · · · · · · · ·		<u> </u>		
36	144	2948	-103	 	 			 		h
37	148	3072	21	 	 			 	<u> </u>	
38	152	2854	-197		 		<u> </u>	 	ļ	
39	156	2740	-311	 	 	 		 	 	
40	160	2545	-506	 	 	 	<u></u>	 		
41	164	2335	-716	<u> </u>	 	 		 	 	
42	168	2603	-448	 		 	<u> </u>	 	 	
43	172	2707	-344		 	t		 	 	
44	176	2618	433	 	 	 		1	 	
45	180	2437	-614			l		 		
46	184	2604	-447	 	 	 		 	 	
47	188	2469	-582	 	 	 		 	 	
48	192	2155	-896		 	 		 		
49	192		-896 -950	 	 			1	 	
50		2101		ļ	 		<u> </u>	 	·	ļ
บบ	200	2130	-921		<u> </u>	<u> </u>			<u> </u>	<u> </u>

i	·				
Background Start 1240 hrs: 609	9 Background 1' mark:	3537	Instrument:	Calibrat	ion Due
Background End 1440 hrs: 281	0 Background 3' mark:	3051	Serial No:		
			Probe:		
Surveyed By: Henry W. Siegris	Date:	07/18/2001	Serial No:		
Reviewed By:	Date:				
D1100 #					

Attachment C PSR-4 Instrument Guidelines

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www.radprobe-aees.com

General Information

The PSL-4 Proportional Probe is a gas flow detector used in 4" piping systems. This design will navigate multiple 90° pipe bends, hurtle internal welds while maintaining center position. The probe has a near Zero insertion force with a "push" through concept, thus simplifying the survey techniques. Gas flow is fed through the cable and connector. The unit is equipped with a quick disconnect port for use with the Model FT insertion device (optional). Two versions are available: the PSL (screen less) and the PSR (screen ruggedized). Ruggedized units are outfitted for class level piping systems and/or harsh environments.

Concept

The PSL series of pipe probes were developed for survey of straight run pipe with (2-3) 90° bends where the pipe conditions were seamless welded pipe with welded connections. The ability to insert the probe into a length of up to 25' in steel pipe was first developed to survey electrical conduits and small air ducts at environmental remediation sites. The success of these probes was tested and found to be usable in other conditions as well. {i.e., drain line entry ports in floors and sinks, wall penetrations for electrical pipe chases, water lines with mild sediment build up, etc.}

Additionally were the observations of the accessability and limitations of the probe within certain pipe compositions. Examples are:

Seamless welded pipe defines the interior surface as having a relatively smooth inner surface. Some pipes contain an inner bead at the joint where the rolled edges meet. The probe design was able to navigate these conditions as long as the user does not attempt to rotate the probe when inserted. Tracking was observed to be straight and with minimal drag. However, some drag may be observed in pipes where the seam weld is large. At welded connections the probe was able to hurtle the interior welds bead with ease.

Electrical EMT conduits were comprised with straight pipe using compression fitting couplings and sweeping 90° bends, . Minimal restrictions were experienced at insertion depths of >50°. The use of electrical pulling soaps (used to lubricate cables during installations) creates a risk of dirt build up and may leave the pipe interior dirty. Thus some probe extractions found the probe to be covered with an oily like substance on the rollers.

or lette

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Air ventilation Ducts of 4" or smaller were observed to have directional limitations. The internal fittings of air ducts require one end of the duct pipe to be tapered in order to insert into the adjoining duct pipe. This creates a reduced chance of withdrawal of the probe when the survey is complete. Often times it was required to remove the probe at the far end and withdrawal the cable from the insertion end. These internal tapered edges create too large of a hurtle for the probe rollers. On a good note, was the ability of the probe to pass by dents and kinks in the duct surfaces.

PVC was the most limiting composition for standard probes. The probe will navigate straight runs with ease. The probes (at the joints in PVC piping) are not capable of passing over these hurtles with the use of small rollers. Larger rollers were used for applications of PVC. Probe insertion and navigating the probe through the bends was accomplished with 3/4" rollers.

Probe usage

Probe navigating is performed by use of the centering legs and a fish tape. The concept of the probe is to use the 8 spring loaded rollers to center the detector within the pipe. The rollers create a near zero friction and with the use of the fish tape, the probe is pushed into the pipe. The self-centering nature of the design will allow for the probe to orbit through the pipe. This orbital motion may be observed by installing the probe into a short piece of pipe (sized accordingly) and noticing the angles of view as the probe is varied along the pipe axis. See figure one.

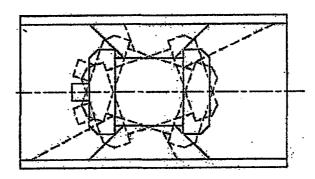


Figure 1

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This orbital motion allows the probe to conform to obsticals while it maintains a fairly constant centering position. The fields of view (angle of view) may vary during insertion. The area of view (internal surface area of the pipe) should remain consistent. The larger 3" and 4" probe tend to center lower in the pipe due to the additional weight of the probe. Future designs are being evaluated to reduce the probes weight.

Connection is as follows: connect the C series gas/HV cable to the probe and the opposite end to the gas feed connector block. The BNC connection of the connector block goes to the electronics box. Connect the P-10 gas supply to the connector block. Note. The use of standard cable is not possible, unless they are adapted for passage P-10 gas. The quick disconnect fitting of the probe is a sealed port and will not accept gas. Connect the fish tape to this port. Wrap the coax around this fish tape as insertions begin. Wrapping the coax will reduce drag by the cable which helps to assist probe insertion.

Operating

	Specifications	
High Voltage (nominal operating) 1800	Volts	Used with Model TR
Mylar Density (aluminized) 0.8	mg/cm² (single wrap)	Transport Rig or Customer
Length (including connector) 4.5	Inches	owned electronics with
Diameter (without centering springs)-2.5	Inches	Option GP-1 Gas Purge
Input Sensitivity Range 5-10	Milli Volts	Fitting.
Nominal Efficiencies (4π)	At ¾" Geometry	
$TH-230 - \approx 2.0$	%	· .
TC-99 ≈ 3.5	%	Cable lengths range from
SRY-90	≈ 6.0 %	5' to 50' increments.
PB-210 ≈ 5.5	%	
Average Background 150-18	0 Counts/min	Optional Model FT insertion
Active Area 66	Cm ²	Device
Weight 1.3	LBS	
Operating Gas-P-10	@ 50 cc/min flow rate	

The connections on the PSL series probes are a "C" series connector and a quick disconnect fitting. The Quick Disconnect must be understood to be a connection for the fish tape only, NOT a gas connection. The P-10 gas is fed through the coax cable. Not all applications require the use of a fish tape to insert the probe. {i.e., vertical runs or pipes where gravity will assist insertion} Therefore, the design utilizes the coax to feed the gas, thus reducing the need for the fish tape in some applications.

The gas flow rate is 50 cc/min. Purge time is 30-45 minutes at 50 cc/min. The purge time may be shortened by increasing the P-10 flow rate to 100 cc/min.

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At the normal operating voltage, a random arc may occur. This may be heard audibly at times. Numerous testing efforts to prevent this occurrence found the cause to be associated to the design of the probe. The internal surface of the detector is cylindrical with the anode wires situated at 30 degree angles to the inner cylinder. The distance at the center of the anode wire is in closer geometry to the cylindrical surface than that of the two end points of the anode wire. Since the charged field developed across the anode wire is exposed to a curved geometry, the risk of random arcing is at a higher possibility at the closer geometry areas along the anode wire. The effects of these arc's were also found to have a minimal contribution to the overall counts. The effects were determined to be less than 3 additional counts per arc.

In cases where the arcing adds large amounts of counts to the display, is an indication of detector over-voltage.

The detector is covered with a .8 mg/cm/sq mylar, single wrap.

Testing the probe stability was performed over months of background count rate monitoring and efficiency testing. Numerous tests were conducted for 10 minute count runs and the averages deduced from 2 hour testing intervals. Test results show the average probe background to be 165 cpm in a 10-15 μ R background. Increases in back ground counts were observed when the probe reached a physical temperature of >95 degrees.

Plateau; high voltage adjustments may be required for large changes in elevations (atmospheric pressure). Calibration from the manufacturer is 900'. The input sensitivity is recommended between 5-10 millivolts.

Operating characteristics of the probe is a gas flow, proportional concept. The ability to retrieve alpha and beta results from proportional probes may be enhanced with the use of dual detection electronics such as the LMI 2224 rate meter scale. The dual channel 2224 produces independent alpha and beta display results at a single operating voltage. When a single channel piece of electronics is used, an operating voltage for each isotope will be required.

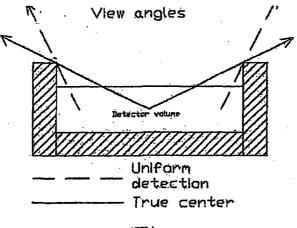
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Interpretation of data, Disclaimer

AEES Inc. developed this approach to pipe detection to satisfy a need at a remediation site, for the access to the interior surfaces of cylindrical objects only. The principles for proportional detection were applied in the design to make this effort to survey cylindrical objects possible. The interpretation of the resulting data can produce an sizable task to analyze; if not kept to the basics. The amount of possible interpretations for: detection area in cm² vs probe geometry, the detector view angles with respect to theoretical detector center, pipe surface area vs orbital angle and respective view angles and the source calibration methods has forced AEES Inc. to require the end users organization to determine the applicable factors in interpreting the resulting data.

AEES Inc. has been involved in probe manufacture for many years and has determined that several factors should be held to a basic approach.

Theoretical center of detector has a direct basis for the view angles of the probe. The angle of view will be dependent on issues like "incident angle of detection". At which point does a event go missed because the angle of the interaction to the detector surface; was to large. If a true center of the probe were used the angles of view would be large. If a uniform detection plane is used (equal detection across the internal volume of the detector) then the angles of view would be smaller. Since proportional probes poses near equal efficiencies across the face of the detectors (when properly calibrated), it can be assumed that the detection properties are as effective near the detector edges as well as the center. AEES Inc. classifies a proportional probe as having uniform detection qualities. View angles could then be smaller and more defining to areas of 100 cm².

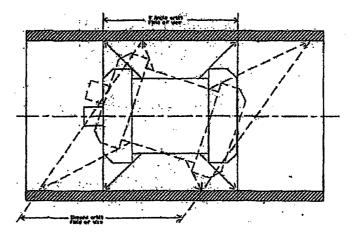


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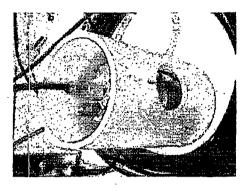
Pipe surface area vs orbital angle and respective view angles could result in "surface area of detection" variations. AEES Inc. recommends an average value be assessed and used as a constant value.



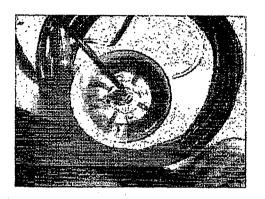
Calibration methods are defined by the end user. The availability of cylindrical sources is now becoming more addressed by source manufacturers as more probes of these types are being designed. Currently; however, they are limited and costly. Flexible sources are available from some source manufacturers. AEES has not yet found a source supplier whom can produce sources as we deem appropriate for our design; thus at present, AEES utilizes flat sources positioned in a source jig where the average surface area of the source is held at a 3/4" geometry. The reported efficiency values are determined without area correction factors.

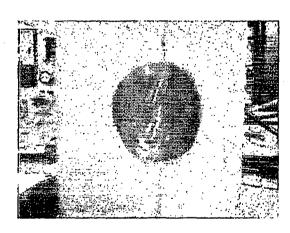
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Below are some photos displaying the probe.



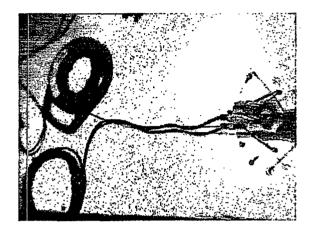
Source calibration / check jig.

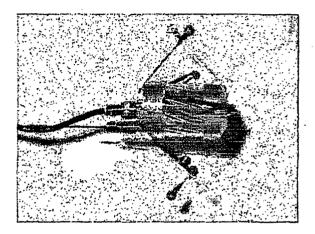




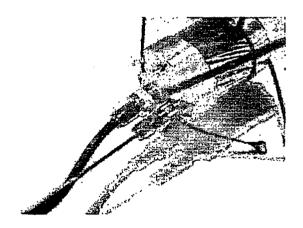
Orient the probe such that the source location is centered in the window of the probe.

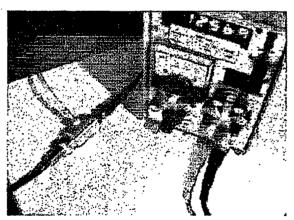
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Probe connection to the coax and fish tape.

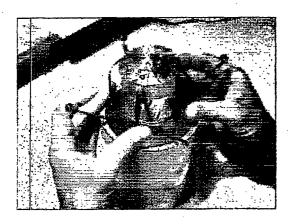




Probe connection and coax cable gas connection.

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Insertion method.





Grasp the four roller legs (of the connector end) with the thumb and index finger. Spring the four legs together and load them into the pipe end. Then insert the probe into the pipe. It is recommended that the coax (at least) be attached to the probe at time of insertion. In cases where the inner surface is smooth or slick, the probe may roll out of reach.



Survey and Soil Sample Results Data Packages

	SURVEY	UNIT 1A (High L	evel and Lo	w Level Labs & Isotop	e Storage Are	a)	
	·	1 MINUTE DIRECT ME MEASUREMENT RESULT, T		DIRECT HINUTE DIRECT MEASUREMENT JREMENT RESULT, TOTAL SR-90 SR-90 BETA SMEAR SR-90		SR-90 BETA SMEAR	
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm²
1A-1	Wali	104 .	159	294	83.1	158	Q
1A-2	Wall	94	133	. 208	83.1	149	0
1A-3	Wall	115	142	144	· 83.1	184	18
1A-4	Wall	101	153	278	83.1	142	0
1A-5	Wali	106	162	299	83.1	162	0
1A-6 .	Floor	98	131	. 176	83.1	156	0
· 1A-7	Wali	112	154	224	83.1	169	3
1A-8	Wall	106	157	272	83.1	201	36
1A-9	Floor	114	190	406	83.1	170	4
1A-10	Floor	112	169	304	83.1	153 ·	0
1A-11	Wall	101	160	315	83.1	165	0
1A-12	Wall	98	161	337	83.1	141	0
1A-13	Floor	103	117	75	83.1	155	0
1A-14	Wall	121	145	128	83.1	162	0
1A-15	Wall	97	181	342	83.1	181	. 15
1A-16	Wali	99	160	326	83.1	143	0
_ Date:	1/8/01						
Surveyor:	Edmond Young						

(1) Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2221 serial # 161581 / 43-89 scintillation probe # 0508

Instrument Efficiency: 0.1

0.1872

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.48

LOCATION DESIGNATION	DESCRIPTION OF LOCATION
1A-1	High Level Lab northwest corner on wall 0.48 meters above floor
1A-2	High Level Lab west wall 0.61 meters above floor
1A-3	High Level Lab west wall 0.61 meters above floor
1A-4	High Level Lab north wall 1.78 meters above floor
1A-5	High Level Lab south wall 0.3 meters above floor
1A-6	High Level Lab floor west side
1A-7	High Level Lab northeast corner on partition between high & low level labs 0.48 meters above floor
1A-8	High Lavel Lab south well 1.6 meters above floor
· 1A-9	High Level Lab floor south side
1A-10	High Level Lab floor north side
1A-11_	High Level Lab east partition between high & low level labs 1.78 meters above floor
1A-12	High Level Lab south wall 0.3 meters above floor
1A-13_	Low Level Lab floor east side
1A-14	Low Level Lab west partition wall between high & low level labs 0.48 meters above floor
1A-15	Low Level Lab east partition wall between low level lab & counting room 1.0 meters above floor
1A-16	Low Level lab north wall 1.78 meters above floor

						ŀ	
		1 MINUTE D MEASUREMENT COUNT	RESULT,	DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY	i e	ETA SMEAR S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm²
1A-5XD	Wall	153	233_	352	82.65	179	14
1A-9XD	Floor (Soli)	215	284	303	82.65	185	20
1A-15XD	Wall	179_	222	189	82.65	143	0 .

(1) Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2224 serial # 162420 / 43-89 scintiliation probe # PR-171381

Instrument Efficiency: 0,2275

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0,486

<u> </u>	SUR	VEY UNIT 1B (C	ounting Ro	om, Wash Room & Co	rridor 15)		
			DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY	SR-90 BI RESULT	TRANSFERABLE SR-90 SURFACE ACTIVITY		
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 mln)	DPM/100cm²
1B-1	Floor	105	186	433	83.2	201	36
1B-2	Wall	101	161	321	83.2	187	21
1B-3	Wall	112	158	246	83.2	167	1
1B-4	Wali	116	. 179	337	83.2	165	0
1B-5	Wall	98	136	203	83,2	145	0
1B-6	Floor	102	168	353	83.2	159	0
1B-7	Wall	112	144	171	83.2	132	0
1B-8	Wall	114	153	208	. 83,2	142	0
1B-9	Wall	103	159	299	83.2	198	33
1B-10	Floor	127	195	363	83.2	139	0
1B-11	Floor	108	144	192	83.2	141	0
1B-12	Wall	<u>1</u> 15	167	278	83.2	153	Û
<u>1B</u> -13	Wall	107	142	187	83.2	167.	1
1B-14	Floor	94	101	37	83.2	156	0
1B-15	Floor	107	147	. 214	83.2	152	0
1B-16	Wall	115	139	128	83.2	172	. 6
1B-17	Wall	84	119	187	83.2	159	0
Date:	1/9/01	 			<u> </u>	<u> </u>	
Surveyor:	Edmond Young						

Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2221 serial # 161581 / 43-89 scintillation probe # 0508

Instrument Efficiency: 0.1872

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.486

	ST. ALBANS FINAL STATUS SURVEY REPLICATE SUMMARY SHEET										
	SUR	VEY UNIT 1B (C	ounting Ro	om, Wash Room & Co	rridor 15)	; <u> </u>					
		1 MINUTE D MEASUREMEN COUNT	T RESULT,	DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY		ETA SMEAR S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY				
Location Designation	Surface	Amblent Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²				
1B-6XD	Floor	. 166	272	466	82.65	153	0				
1B-15XD	Floor	155	235	352	82.65	160	0				
1B-17XD	Wall	158	167	.40	82.65	162	0				
Date:	01/16/01			·							
Surveyor:	Edmond Young										

⁽¹⁾ Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

Instrument Efficiency: 0.2275

Removable Contamination:

instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.486

LOCATION DESIGNATION	DESCRIPTION OF LOCATION
1B-1	Corridor 15 floor near entrance from corridor 45
1B-2	Corridor 15 north wall (near entrance from corridor 45) 1.65 meters above floor
1B-3	Corridor 15 south wall 0.4 meters above floor
1B-4	Corridor 15 north wall 0.2 meters above floor
1B-5	Corridor 15 south wall 1.85 meters above floor
1B-6	Corridor 15 floor
1B-7	On south side of partition wall between counting room & low level lab 1.04 meters above floor
1B-8	Corridor 15 north wall 1.65 meters above floor
1B-9	Corridor 15 south wall 0.4 meters above floor
1B-10	Counting room floor southwest corner
1B-11	Counting room floor northwest corner 0.18 meters from partition wall
1B-12	On east side (narrow portion bet, corridor & counting room) of corridor 15 north wall 0.2 meters above floor
1B-13	Corridor 15 southeast corner on south wall 1.85 meters above floor
1B-14	Corridor 15 floor washroom (formerly w/sink)
1B-15	Counting room floor east side
1B-16	Counting room northeast corner on north wall 0.76 meter above floor
1B-17	Counting room south wall next to entrance between counting room & corridor 15, 1.65 meters above floor

	ST. ALI			SURVEY SUMMA	RY SHEET		
	SURVEY UNIT 2 (Ejector Pit room)						
		1 MINUTE C	IRECT	DIRECT MEASUREMENT	·		TRANSFERABLE
		MEASUREMENT RESULT, COUNTS		TOTAL SR-90 SURFACE ACTIVITY	SR-90 BE RESULT	SR-90 SURFACE	
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/100cm²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
2-1	Floor	118	180	342	82.5	175	10
2-2	Wall.	110	160	267	82.5	169	4
2-3	_ Waii	109	165	299	82.5	164	C
2-4	Wall	107	156	262	82.5	201	37
2-5	Floor	110	137	144	82.5	141	0
2-6	Floor	104	126	118	82.5	185	21
2-7	Wall	116	189	390	82.5	170	5
2-8	Floor	115	190	401	82.5	177	12
2 .9	Underside of Entry Level Floor	109	125	85	82.5	134	O
2-10	· Wall	114	180	353	82.5	209	45
2-11	Floor	101	136	187	82.5	125	93
2-12	Floor	98	161	337	82.5	175	
2-13	Floor	105	180	294	82.5	172	10
2-13	Wall	118	151	176	82.5	153	0
2-15	Underside of Entry Level Floor		130	118	82.5	157	0
2-16	Wall	102	165	337	82.5	165	· — · — · —
2-17	Wall	110	141	166	82.5	190	26
2-18	Wall	105	160	294	82.5	178	13
Date	1/12/01						
Surveyor	Edmund Young			•			

(1) Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: 1,2221 Sertal # 161581 / 43-89 scintillation probe # 0508

Instrument Efficiency: 0.1872

Removable Contamination:

Instrument Used: L2829 Serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency:

		SURVE	Y UNIT 2	(Ejector Pit room)			
		1 MINUTE DI MEASUREI RESULT, CO	MENT	DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY		ETA SMEAR S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY
Location Designation	Surface	Ambient Background ⁽¹⁾	Count.	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
. 2-6XD	Floor	159	206	207	82.65	178	. 13
2-8XD	Floor	180	293	497	82.65	173	8
2-10XD	Wall	158	227	303	82.65	148	0
Date:							

(1) Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

Instrument Efficiency: 0.2275

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322 Instrument Efficiency: 0.486

LOCATION DESIGNATION	DESCRIPTION OF LOCATION
2-1	Ejector Pit lower level west wall 1.78 meters above floor
2-2	Ejector Pit lower level northwest comer on west wall 1.78 meters above floor
2-3	Elector Pit entry level floor on west wall 1.78 meters above floor
. 2-4	Ejector Pit lower level southwest comer of south wall 1.85 meters above floor
2-5	Ejector Pit lower level southwest comer of floor
2-6	Elector Pit lower level west side of floor
2-7	Elector Pit lower level northwest corner on north wall 0.89 meters above floor
2-8 2-9 2-10	Ejector Pit entry level floor next to west wall on floor Ejector Pit lower level underside of entry level floor 1.58 meters from north wall Ejector Pit lower level south wall 0.70 meters above floor
2-11	Ejector Pit lower level east side of floor
2-12	Ejector Pit lower level northeast comer of floor
2-13	Ejector Pit entry level floor next to railing on floor
2-14	Ejector Pit entry level floor on north wall 0.13 meters above floor
2-15	Ejector Pit lower level underside of entry level floor 0.43 meters from north wall
2-16	Ejector Pit lower level southeast comer on east wall 1.28 meters above floor
2-17	Ejector Pit lower level east wall 1.28 meters above floor
2-18	Ejector Pit entry level floor on east wail 1.28 meters above floor

	ST. ALBANS FINAL STATUS SURVEY SUMMARY SHEET									
		SUI	RVEY UNIT 4	(Men's Tollet)						
		1 MINUTE DIRECT MEASUREMENT RESULT COUNTS		IEASUREMENT RESULT, SURFACE SR-90 BETA SMEAR			INUTE DIRECT TOTAL SR-90 REMENT RESULT, SURFACE SR-90 BETA SMEAR SR		TRANSFERABLE SR-90 SURFACE ACTIVITY	
Location Designation	Surface	Amblent Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²			
4-1	West Wall	140	323	978	83	166	0			
4-2	West Wall	149	297	791	83	174	8			
4-3	West Wall	134	154	107	83	156	Ö			
4-4	West Floor	128	185	304	83	148	0			
4-5	West Floor	137	200	337	83	124	Ø			
4-6	North Wall	136	190	288	83	192	27			
4-7	South Wall	128	300	919	83	174	8			
4-8	East Wall .	131	298	892	83	154	0			
4-9	North Floor	134	174	214	83	166	0			
4-10	North Wali	142	312	908	83	160	0.			
4-11	South Wall	124	316	1026	83	160	0			
4-12	East Wall	131	143	64	83	134	0			
4-13	East Wall	128	292	876	83	136	0			
4-14	East Wall	130	359	1223	83	. 160	0			
Date: Surveyor:	12/07/00 Edmond Young									
- CQIVEYOI.	Editorio 1001M									

⁽¹⁾ Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2221 serial # 161581 / 43-89 scintillation probe # 0508

Instrument Efficiency: 0.1872

Removable Contamination:

instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0,485

	ST. ALBANS			EY REPLICATE	SUMMARY	SHEET	
		1 MINUTE DIRECT MEASUREMENT RES COUNTS		•		SR-90 BETA SMEAR RESULTS, COUNTS	
Location Designation	Surface	Amblent Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
4-4XD	West Floor	. 197	258	268	82.65	153	0
4-6XD	North Wall	199	271	316	82.65	151	0
. 4-14XD	East Wall	216	401	813	82.65	168	. 3

⁽¹⁾ Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Date: 01/16/01 Surveyor: Edmond Young

Direct Scan:

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

Instrument Efficiency: 0.2275

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.486

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	LOCATION DESIGNATION	DESCRIPTION OF LOCATION	
	4-1	Southwest corner of west wall 0.94 meters above floor	
	4-2	Middle of west wall 0.94 meters above floor	. ,
	4-3	Northwest corner of west wall 0.94 meters above floor	
	4-4	Floor south side near entrance	
	4-5	Floor north side	
	4-6	Northwest corner of north wall 0.41 meters above floor	
	4-7	Southeast corner on east wall of entrance 0.34 meters above floor	
	4-8	Northeast comer on east wall of entrance 0.34 meters above floor	
•	4-9	Floor near north wall	
•	4-10.	North wall 1.26 meters above floor	
	4-11	South wall next to former stall area 1.04 meters above floor	
	4-12	East wall of entrance 1.81 meters above floor	
	4-13	East wall of former stall area 0.15 meters above floor	
•	. 4-14	East wall of former stall area 1.62 meters above floor	
	4-15	Ceiling ventilation grate west side	
	4-16	Ceiling ventilation grate east side	

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	ST. AL	BANS FINAL	STATUS	S SURVEY SUMM	ARY SHEET	<u>, , , , , , , , , , , , , , , , , , , </u>	
SURVEY	UNIT 5 (Corrido	45, Treatment L	Jnit & Ass	ociated Equipment Roc	om, and Foye	at Foot of Stairs)
	MEASUREM RESULT, COL		1 MINUTE DIRECT N MEASUREMENT RESULT, COUNTS SU		SR-90 BETA SMEAR RESULTS, COUNTS		TRANSFERABLE SR-90 SURFACE ACTIVITY
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/160cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
5-1	Wall (1/10/01)	120	431	1661	80.45	185	25
5-2	Wall (1/10/01)	115	123	43	80.45	163	2
5-3	Floor (1/10/01)	108	146	203	80.45	169	8
5-4	Wall (1/10/01)	112	395	1512	80.45	204	44
5-5	Wall (1/10/01)	119	387	1432	80.45	141	0 ·
5-6	Floor (1/10/01)	103	163	321	80.45	159	0
5-7	Floor (1/12/01)	115	164	262	82.5	150	0
5-8	Wall (1/12/01)	120	342	1186	82.5	181·	16
5-9	Wali (1/12/01)	118	330	<u>1132</u>	. 82.5	147	. 0
5-10	Wall (12/27/00)	. 116	171	294	81.3	167	5
5-11	Floor (12/27/00)	108	134	139	81.3	158	O
5-12	Floor (1/12/01)	98	102	21	82.5	150	0 .
5-13	Wall (1/12/01)	124	352	1218	82.5	165	0
5-14	Wali (12/27/00)	105	203	524	81.3	152	0
5-15	Floor (12/27/00)	103	215	598	81.3	169	7
5-18	Floor (1/12/01)	111	136	· 134	82.5	171	6
5-17	Wall (1/12/01)	116	349	1245	82.5	165	0.
Date:		/01, & 1/12/01					
Surveyor:	Edmond Young						
(i)	Background mea	surement performe	d using a w	ooden shield (i.e., result rej	presents only ga	mma component)	
Direct Scan:	i.	Instrument Used:	L2221 seria	 # 161581 / 43-89 scintlla	tion probe # 050	<u> </u>	
	Ins	trument Efficiency:	0.1872			Ĭ ·	
Removable Contamination:	ins	Instrument Used: trument Efficiency:					

	ST. ALBANS FINAL STATUS SURVEY REPLICATE SUMMARY SHEET SURVEY UNIT 5 (Corridor 45, Treatment Unit & Associated Equipment Room, and Foyer at Foot of Stairs)													
SURVEY U	NIT 5 (Corridor	45, Treatment U	nit & Asso	ciated Equipment Roo	m, and Foyer	at Foot of Stairs)							
		1 MINUTE DIRECT MEASUREMENT RESULT, COUNTS		DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY	SR-90 BI RESULT	TRANSFERABLE SR-90 SURFACE ACTIVITY								
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm²							
5-3XD	Floor	196	220	105	82.65	. 147	0							
5-6XD	Floor	170	209	171	82.65	173	8							
5-8XD	Wall	271	550	1226	82.65	147	0							
Date:	01/16/01													
· Surveyor:	Edmond Young	l												

1) Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

Instrument Efficiency: 0.2275

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.486

LOCATION DESIGNATION	DESCRIPTION OF LOCATION
5-1	Corridor South Wall opposite entrance to lab
5-2	Not accessible - use door to lab entrance 0.59 meters above right hand lower comer of door
5-3	Corridor 45 floor
5-4	Corridor South Wall next to ejector pit entrance
5-5	Corridor North Wall opposite ejector pit entrance
5-6	Comidor 45 floor
5-7	Foyer floor next to shield wall outside entrance to x-ray treatment room
5-8	X-ray treatment room west wall 0.81 meters above floor
5-9	X-ray treatment room south wall 1.5 meters above southwest comer of floor
5-10	X-ray control room north wall 0.15 meters above floor
5-11	X-ray control room floor
5-12	X-ray treatment room floor
5-13	X-ray treatment room north wall 0.5 meters above floor
5-14	X-ray control room south wall 1.85 meters above southeast corner of floor
5-15 ·	X-ray control room floor
5-16	X-ray treatment room floor
5-17	X-ray treatment room south wall 1.5 meters above southeast corner of floor

•				SURVEY SUMMA rage Above Machine I		· · · · · · · · · · · · · · · · · · ·	· · · · · ·
	1 MINUTE DIRECT MEASUREMENT RESULT, COUNTS		DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY	SR-90 BI RESULT	TRANSFERABLE SR-90 SURFACE ACTIVITY		
		Ambient				Sample Count (2	
Location Designation	Surface	Background ^(f)	Count	DPM/100cm ²	(cpm)	min)	DPM/100cm²
8A-1	Wall	178	243	347	79.55	165	88
8A-2	Wall	179	222	230	79.55	172	13
8A-3	Wall	138	178	214_	79.55	171	12
8A-4	Wail	183	275	491	79:55	172	13
8A-5	Floor	160	250	. 481	79.55	180	22
8A-6	Floor	124	216 ·	491	79.55	182	24
8A-7	Wall	150	214	342	79.55	167	8
8A-8	Floor	126	853	3884	79.55	169	10
8A-9	Floor	120	162_	224	79.55	170	11
8A-10	Floor	118	186	363	79.55	180	22
8A-11	Wali	187	253	353	79.55	177	18
8A-12	Wall	. 190	230	214	79.55	165	6
8A-13	Wali	132	160	150	79.55	147	0
8A-14	Wall	182	235	283	79.55	187	29
8A-15	Wall	188	. 240	278	79.55	171	12
Date:	1/25/01					}	
Surveyor:	Edmund Young		7				

⁽¹⁾ Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2221 serial # 161581 / 43-89 scintiliation probe # 508

Instrument Efficiency: 0.1872

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency:

0.486

·				SURVEY SUMMA rage Above Machine F			·
		1 MINUTE D MEASUREMENT COUNT	IRECT RESULT,	DIRECT MEASUREMENT	SR-90 B	ETA SMEAR 'S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY
Location Designation	Surface	Amblent Background ⁽¹⁾	Count	DPM/10Bcm²		Sample Count (2 min)	DPM/100cm ²
6A-9XD	Floor	124	188	281	79.55	160	. 1
8A-10XD	Floor	161	205	193	79.55	165	6
8A-13XD	Wall	150	190	176	79.55	172	13
Date:	1/26/01						
Surveyor:	Edmund Young						

⁽¹⁾ Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2221 serial # 162420 / 43-89 scintillation probe # 171381

Instrument Efficiency: 0.2275

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.486

LOCATION DESIGNATION	DESCRIPTION OF LOCATION	
8A-1	X-ray shield wall outside surface	
8A-2	X-ray shield wall outside surface	·
8A-3	X-ray shield wall outside surface	
8A-4	North wall 0.9 meters above floor in northeast corner	· · · · · · · · · · · · · · · · · · ·
8A-5	East floor next to X-ray shield wall	• •
8A-6	Southeast comer on floor near wall	
8A-7	South wall 1.73 meters above floor	
8A-8	North portion of floor 1.0 meter from wall	
8A-9	Center of room on floor	
8A-10	South portion of floor near wall	
8A-11	Wall on south side of room behind stairs to lower level 0.9 meter above floor	
8A-12	Wall on east side stairs to lower level, north comer 0.33 meter above floor	
8A-13	Wall on east side stairs to lower level, south corner 0.33 meter above floor	· · · · · · · · · · · · · · · · · · ·
8A-14	South wall 0.26 meters above floor	
8A-15	Wall in southwest corner of room 1.15 meters above floor	

		SURVEY UNIT	78B (Radi	laterial Storage Area)			
•		1 MINUTE DIRECT MEASUREMENT RESULT, COUNTS		DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY		TA SMEAR S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY
Location Designation	Surface	Ambient Background ⁽⁷⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
8B-1	Wali	124	159	72	79.55	150	0
8B-2	Floor	131	187	115	79.55	165	6
8B-3	Floor	149	174	51	79.55	141	0
8B-4	Floor	157	174	35	79.55	132	0
8B-5	Wall	165	203	78	79.55	160	1
88-6	Floor	129	209	165	79.55	150	0
8B-7	Floor	155	179	49	79.55	155	0
8B-8	Floor	164	192	58	79.55	161	2
8B-9	Floor	152	177	51	79.55	172	13
8B-10 ·	Wall	162	227	134	79.55	160,	1
-8B-11	Floor	130	185	113	79.55	171	12
8B-12	Floor	141	202	126	79.55	166	7
8B-13	Floor	132	198	136	79.55	153	0
8B-14	Wall	175	225	103	79.55	155	0
Neter	1/25/2001 (5090)	and 1/28/01 (smeet		<u> </u>	ļ	 	
Surveyor:				 		 	

⁽¹⁾ Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2221 serial # 161581 / 43-89 scintillation probe # 0508

Instrument Efficiency: 0.1872

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.486

•		SURVEY UN	IT 8B (Rac	Material Storage Area)		
·	1 MINUTE		DIRECT MEASUREMEI JENTRESULT, TOTAL SR-9		SR-90 B RESULT	TRANSFERABLE SR-90 SURFACE ACTIVITY	
Location Designation	Şurface	Ambient Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
8B-1XD	. Wall	182	203	92	79.55	167	8
8B-3XD	, Floor	167	198	127	79.55	141	0
8B-8XD	Floor	172	210	167	79.55	156	0
Date:	1/26/01	·					
Surveyor	Edmund Young						

(1) Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Direct Scan:

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

Instrument Efficiency: 0.2275

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322 instrument Efficiency: 0.486

LOCATION DESIGNATION	DESCRIPTION OF LOCATION
8B-1	North wall 1.65 meters above floor in northeast corner
8B-2	Northeast side of floor near doorway
8B-3	East side of floor next to wall
8B-4	Southeast side of floor near doorway
8B-5	On south wall 1.86 meters above the floor
8B-6	North portion of floor next to wall
8B-7	North middle section of floor
8 B- 8	South middle section of floor
. 8B-9	South portion of floor near wall
8B-10	North wall 1.66 meters above floor in northwest corner
8B-11	Northwest side of floor near wall
· 8B-12	West side of floor near wall
8B-13	Southwest side of floor near wall
8B-14	On south wall 1.84 meters above the floor



STL St. Louis 13715 Rider Trail North Earth City, MO 53045

Tel 314 298 8566 Fax 314 298 8757 www.stl-inc.com

ANALYTICAL REPORT

PROJECT NO. VA

St. Albans

Lot #: F1A080114

Tim Taylor

Stone & Webster Engineering Co 245 Summer Street Boston, MA 02210

SEVERN TRENT LABORATORIES, INC.

Ron Martino Project Manager

February 5, 2001

STL St. Louis is a part of Severn Trent Laboratories, Inc.

Case Narrative LOT NUMBER: F1A080114

This report contains the analytical results for the 23 samples received under chain of custody by STL St. Louis on January 8, 2001. These samples are associated with your St. Albans project.

All applicable quality control procedures met method-specified acceptance criteria.

This report is incomplete without the case narrative. All results are based upon sample as received, wet weight, unless noted otherwise.

Observations/Nonconformances

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

There were no anomalies with this analysis.

METHODS SUMMARY

F1A080114

PARAMETER ANALYTICAL PREPARATION METHOD METHOD

STRONTIUM 90 Sr90-Y90 cal

DOE 7500-SR MOD

References:

DOE

"DOE METHODS FOR EVALUATING ENVIRONMENTAL AND WASTE MANAGEMENT SAMPLES" OCTOBER 1994 US DEPARTMENT OF ENERGY

SAMPLE SUMMARY

F1A080114

	WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
	DTCW5	001	SA59S301XX	01/03/01	15:00
	DTCW8	002	SA5SS302XX	01/03/01	15:00
	DTCW9	003	SA5SS303XX	01/03/01	15:00
	DTCXA	004	SA5SS302XD	01/03/01	15:00
	DTCXC	005	SAISS312XX	01/03/01	15:00
	DTCXD	006	SAISS313XX	01/03/01	15:00
	DTCXE	007	SAISS314XX	01/03/01	15:00
•	DTCXF	800	SA1SS315XX	01/03/01	15:00
	DTCXG	009	SA1SS314XD	01/03/01	15:00
	DTCXH	. 010	SA1SS301XX	01/03/01	15:00
	DTCXJ	011	SA1SS302XX	01/03/01	15:00
	DTCXK	012	SA1SS303XX	01/03/01	15:00
	DTCXL	013	SA1SS304XX	01/03/01	15:00
,	DTCXM	014	SA1SS305XX	01/03/01	15:00
	DTCXN	015	SA1SS306XX	01/03/01	15:00
•	DTCXP	016	SA1SS307XX	01/03/01	15:00
	DTCXQ	017	SA1SS308XX	01/03/01	15:00
	DTCXR	018	SAISS309XX	01/03/01	15:00
	DTCXV	019	SAISS310XX	01/03/01	15:0¢
	DTCXW	020	SAISS311XX	01/03/01	15
	DTCXO	021	SAISS301XD	01/03/01	
	DTCX1	022	SAISS309XD	01/03/01	
	DTCX2	023	SA1SS311XD	01/03/01	
					-

NOTE (S) :

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

Client Sample ID: SA5SS301XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-001

DTCW5

Work Order: Matrix:

SOLID

Date Collected: 01/03/01 1500

Date Received: 01/

OBLOT OBTO	08/01 0910
------------	------------

. Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date	Batch #	YId 4
SR-90 BY GFPC	DOE 7500-SR MOD		ŗ	ci/g	7500-	SR MOD		
Strontium 90	-0.02	ס	0.35	0.62	01/23/0	01/31/01	1023234	100

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.

Bold results are greater than the MDC

Result is less than the sample detection limit.

Client Sample ID: SA5SS302XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-002

Work Order: DTCW8

SOLID Matrix:

Date Collected: 01/03/01 1500 Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 o+/~)	. MDC	Prep Date	Analysis Date 1	Batch #	Yld *
SR-90 BY GFPC	DOE 7500-SR MOD			pCi/g	7500-	er mod		
Strontium 90	0.04	Ü	0.42	0.72	01/23/0	1 01/31/01 1	.023234	100

NOTE (S)

Data are incomplete without the case narrative. MDC is determined by instrument performance only. Bold results are greater than the MDC. Result is less than the sample detection limit.

Client Sample ID: SA5SS303XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-003

DTCW9 Work Order: SOLID Matrix:

Date Collected: 01/03/01 1500

Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 gt/-)	мос	Prep Date	Analysis Date	Batch #	Yld &
SR-90 BY GFPC	DOE 7500-SR MOD			pCi/g	7500-	SR MOD		
Strontium 90	0.47	U	0.40	0.65	01/23/0	1 01/31/01 1	.023234	100

NOTE (S)

Data are incomplete without the case narrative.

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

Result is less than the sample detection limit.

Client Sample ID: SA5SS302XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-004

Work Order: DTCXA

Matrix: SOLID

Date Collected: 01/03/01 1500 Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
SR-90 BY GFPC	DOE 7500-SR MOD		pC	i/g	7500-8	R MOD		
strontium 90	-0.07	υ	0.31	0.54	01/23/01	01/31/01	1023234	100

NOTE (S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.

Bold results are greater than the MDC

Result is less than the sample detection limit.

Client Sample ID: SA1SS312XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:FlA080114-005

Work Order: DTCXC Matrix: SOLID

Date Collected: 01/03/01 1500 Date Received: 01/08/01 0910

Parameter	Result	Qual	Uncert. (2 g+/-)	MDC	Prep Date	Analysis Data B	atch #	Yld %
SR-90 BY GFPC	DOE 7500-SR MOD		pCi	i/g	7500~	SR MOD		
strontium 90	1.27		0.47	0.59	01/23/0	1 01/31/01 10	23234	100

Client Sample ID: SA1SS313XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-006

Work Order: Matrix:

DTCXD SOLID

Date Collected: 01/03/01 1500

Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysia Date	Batch #	Ald #
SR-90 BY GFPC	DOE 7500-SR MOI)		pCi/g	7500-	er mod		
Strontium 90	0.33	U	0.36	0.60	01/23/0	1 01/31/01	1023234	100 ·

Client Sample ID: SA1SS314XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-007

Work Order: DTCXE

Matrix:

SOLID

Date Collected: 01/03/01

1500

Date Received:

01/08/01 0910

Parameter	Result	Qual.	Total Uncert. (2 g+/-)	мос	Prep Data	Analysis Date Batch #	Yld t
SR-90 BY GFPC	DOE 7500-SR MOD		q	Ci/g	7500-	SR MOD	,
Strontium 90	2.14		0.59	0.57	01/23/0	1 01/31/01 1023234	100

Client Sample ID: SA1SS315XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-008

Work Order: Matrix:

DTCXF SOLID Date Collected: 01/03/01

Date Received:

01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld &
SR-90 BY GFPC	DOE 7500-SR MOD			pCi/g	7500-	R MOD	· ·	
Strontium 90	0.05	n .	0.41	0.71	01/23/0	1 01/31/01	1023234	100

Data are incomplete without the case narrative. MDC is determined by instrument performance only. Bold results are greater than the MDC Result is less than the sample detection limit.

Client Sample ID: SA1SS314XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-009

Work Order: Matrix:

DTCXG SOLID Date Collected: 01/03/01 1500 Date Received:

01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 gt/-)	MDC	Prep Date	Analysi: Date	Batch #	Yld §
SR-90 BY GFPC	OOE 7500-SR MOD		po	ii/g	7500-	SR MOD		
Strontium 90	6.6		1.4	. 0.6	01/23/6	01/31/	01 1023234	100

Client Sample ID: SAISS301XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-010

Work Order:

DTCXH

Matrix:

SOLID

Date Collected: 01/03/01 1500 Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld 4
SR-90 BY GFPC	DOE 7500-SR MO	Ď	pC	i/g	7500-8	R MOD		
Strontium 90	1.07		0,47	0.56	01/23/0	1 01/31/01	1023234	100

Client Sample ID: SA1SS302XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-011

Work Order: Matrix:

DTCXJ

SOLID

Date Collected: 01/03/01 1500

Date Received:

01/08/01 0910

	Parameter	Result	Qual	Total Uncert. (2 g+/-)		мос_	Prep Date	Analysia Date	Bätch #	Yld %	
••	SR-90 BY GFPC	DOE 7500-SR MOD			pCi/g		7500-si	R MOD			_
	Strontium 90	0.20	ט	0.39		0.66	01/23/01	01/31/01	1023234	97	

Data are incomplete without the case narrative.

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

Result is less than the sample detection limit.

Client Sample ID: SA1SS303XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-012

Work Order:

DTCXK

Matrix:

SOLID

Date Collected: 01/03/01 Date Received: 01/08/01

Paramet o ;	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Data	Analysis Date	Batch #	Yld %
SR-90 BY GFPC DOE	7500-9R MOD		pCi/g		7500-SI	COM S		
Strontium 90	1.84		0.56	0.62	01/23/01	01/31/01	1023234	100

Client Sample ID: SA1SS303XX DUP

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-012X

Work Order:

DTCXK

Matrix:

SOLID

Date Collected: 01/03/01 1500

Date Received:

01/08/01 0910

Parameter	Result Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld &
SR-90 BY GFPC DOE	7500-SR MOD		pCi/g	7500-8	BR MOD		
Strontium 90 1	.76	0.54	0.61	01/23/0	1 01/31/01	1023234	100

Client Sample ID: SA1S5304XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-013

Work Order: DTCXL

SOLID Matrix:

Date Collected: 01/03/01 Date Received: 01/08/01 0910

Total

Uncert. Prep Analysis Result Qual $(2 \sigma^{+}/-)$ MDC Data Date Batch # Yld & Parameter 7500-SR MOD SR-90 BY GFPC DOE 7500-SR MOD pCi/g 0.51 01/24/01 02/01/01 1024214 2.34 0.60 89 Strontium 90

Client Sample ID: SA1SS305XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-014

Work Order: Matrix: DTCXM SOLID

OSU114-014 Date C

Date Collected: 01/03/01 150

Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 o+/-)	MDC	Prep Date	Analysis Date I	Batch #	Yld %
SR-90 BY GFFC	DOE 7500-SR MOD		pc	i/g	7500-	SR MOD		
Strontium 90	0.98		0.42	0.57	01/24/0	1 02/01/01 1	024214	80

Client Sample ID: SA1SS306XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-015

Work Order: DTCXN

Matrix:

SOLID

Date Collected: 01/03/01

Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	мос	Prep Date	Analysis Date	Batch #	Yld \$
SR-90 BY GFPC	DOE 7500-SR MOD		pCi/g		7500-	SR MOD		
Strontium 90	0.68		0,39	0.59	01/24/0	02/01/01	1024214	79

Client Sample ID: SA1SS307XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-016

Work Order: Matrix:

DTCXP SOLID

Result

DOE 7500-SR MOD

Date Received:

Date Collected: 01/03/01 1500

01/08/01 0910

Total Uncert.

Qual

Prep Analysis (2 0+/-) Date Date MDC pCi/g

7500-SR MOD

Batch #

SR-90 BY GFPC Strontium 90

Parameter

0.72

0.42

0.64

01/24/01 02/01/01 1024214

79

Yld %

Client Sample ID: SAISS308XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-017

Work Order: DTCXQ

Matrix:

SOLID

Date Collected: 01/03/01 1500 Date Received: 01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Analysi Data Data	Batch #	Yld %
SR-90 BY GFPC	DOE 7500-SR MOD		p(Ci/g	7500-SR MOD		,
Strontium 90	1.69		0.48	0.47	01/24/01 02/01/	01 1024214	90

Client Sample ID: SA1SS309XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-018

Work Order: Matrix:

DTCXR SOLID Date Collected: 01/03/01

1500

Date Received:

01/08/01 0910

	Parameter	Result	Qual	Total Uncert. (2 o+/-)	MDC	Prep Date	Analysis Data	Batch #	ria t
•	SR-90 BY GFPC DO	E 7500-SR MOD		pCi/g		7500-8	R MOD		
	Strontium 90	6.81		0.89	0.60	01/24/03	02/02/01	. 1024214	. 88

Client Sample ID: SA1SS310XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114~019

Work Order: DTCXV

Matrix:

SOLID

Date Collected: 01/03/01

1500

Date Received:

01/08/01 0910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Data Batch	# Yld %
SR-90 BY GFPC	DOE 7500-SR MOD			pCi/g	7500-	SR MOD	•
Strontium 90	4.23		0.95	0.56	01/24/	01 02/02/01 102421	14 89

Client Sample ID: SA1SS311XX

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-020

Work Order: Matrix:

SOLID

DTCXW

Date Collected: 01/03/01 Date Received: 01/08/01

Total Uncert. Prop Analysis (2 0+/-) Date Date . Batch # Yld & Result Qual MDC Parameter SR-90 BY GFPC .DOE 7500-SR MOD pCi/g 7500-SR MOD 0.6 01/24/01 02/01/01 1024214 74 Strontium 90 4.6 1.0

Client Sample ID: SAISS301XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID: F1A080114-021

Date Collected: 01/03/01 Date Received:

Work Order:

DTCX0

01/08/01 0910

Matrix:

SOLID .

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep	Analysis Date	Batch #	र्गेष ≉
SR-90 BY GFPC	DOE 7500-SR MOD		pC:	i/g	7500-s	R MOD	-	
Strontium 90	0.05	σ	0.39	0.67	01/24/0	02/01/01	1024214 .	71

Client Sample ID: SA1SS309XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-022

Work Order: Matrix:

DTCX1 SOLID Date Collected: 01/03/01 1500

Date Received

ed:	01/	08/0	1 (910

Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date	Batch #	Yld %
SR-90 BY GFPC DO	£ 7500-SR MC	a	pC	i/g	7500-	SR MOD		
Strontium 90	3.27		0.81	0.63	01/24/	01 02/01/01	1024214	79

Client Sample ID: SA1SS311XD

Quanterra, Inc. - Radiochemistry

Lab Sample ID:F1A080114-023

Work Order: DTCX2

Matrix:

SOLID

Date Collected: 01/03/01

1500

Date Received:

01/08/01 0910

	Parameter	Result	Qual	Total Uncert. (2 g+/-)	MDC	Prep Date	Analysis Date B	latch #	Yld &	
. '	SR-90 BY GFPC	DOE 7500-SR MOD		pCi/g		7500-SR MOD				
	Strontium 90	1.03		0.40	0.52	01/24/0	02/01/01 1	024214	86	

METHOD BLANK REPORT

Quanterra, Inc. - Radiochemistry

Client Lot ID:

F1A080114

Matrix:

SOLID

			Total	•		Lab Sample ID			
Parameter	Result	Qual	Uncert. (2 σ+/-)	MDC	Prep	Analysis Date	Batch #	Ard #	
SR-90 BY GFPC Strontium 90	DOE 7500-SR MOD -0.05	U	pCi/g 0.35	7500-SR MOD 0.61	01/23/01		30000-234 1023234	B 100	
SR-90 BY GFPC Strontium 90	DOE 7500-SR MOD -0.11	U	pCi/g 0.43	7500-SR MOD 0.75	01/24/01	F1A2 02/02/01	40000-214 1024214	B 88	

NOTE (S)

)ata are incomplete without the case narrative.

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

Result is less than the sample detection limit.

DUPLICATE EVALUATION REPORT

Quanterra, Inc. - Radiochemistry

Client Lot ID:

F1A080114

Work Order #: Matrix:

DTAC SOLID Date Sampled:

01/02/00

Date Received: 01/05/01

Parameter			Total		·		QC Sample ID		
		SAMPLE Undert. Result (20+/-)		DUPLICATE Result		Uncert. (2 g+/-)	# Yld	Precision	
SR-90 BY GFPC	DOE	7500-SR	pCi/g	7500-8R	MOD		,	F1A050206-007	
Strontium 90		-0.05 Batch	U 0.34	87 (Sample)	0.16 U 1024214		90	367 %RPD	
SR-90 BY GFPC	DOE	7500-SR	pCi/g	7500-sr	MOD			F1A080114-012	
Strontium 90		1.84 Batch	0.56	100 (Sample)	1.76 1023234	0.54 (Duplicate)	100	4 %RPD	

NOTE (8)

Data are incomplete without the case narrative. Calculations are performed before rounding to avoid round-off error in calculated results

Result is less than the sample detection limit.

Laboratory Control Sample Report

Quanterra, Inc. - Radiochemistry

Client Lot ID:

F1A080114

Matrix:

SOLID

			Total				Lab Sample ID			
Parameter		Spike Amount	Result	Uncert, (2 g+/-)		мос	# XJq	t Rec	QC Control Limits	
SR-90 BY GFPC	DOE	7500-SR MOD	pCi/g		7500	-SR MOD		F1A23	0000-234C	
Strontium 90		9.83 Batch #:	5.8 1023234	1.2		0.6 AnalysisDate	100 01/3	59 1/01	49 - 126	
SR-90 BY GFPC	DOE	7500-SR MOD	pCi/g		7500·	-SR MOD		F1A24	0000-214C	
Strontium 90		9.83 Batch #:	11.4 1024214	2.4	٠.	0.8 AnalysisDate	76 02/02	116 . 2/01	49126	

Appendix B:

Survey and Soil Sample Location Maps

SURVEY UNIT 1A (High Level and Low Level Labs & Isotope Storage Area)									
SOIL SAMPLE DESIGNATION	COLLECTION LOCATION DESCRIPTION	Sr-90 ACTIVITY CONCENTRATION (pCi/g)	TOTAL UNCERTAINTY +/- 2 σ (pCi/g)	MDC (pCi/g)					
SA1SS301XX	Stainless steel piping trench below high level lab sink	1.07	0.47	0.66					
SA1SS302XX	Stainless steel piping trench under high level lab fume hood drain north end	0.20	0.39	0.66					
SA1SS303XX	Stainless steel piping trench under high level lab fume hood drain south end	1.84	0.56	0.62					
SA1SS304XX	Stainless steel piping trench below low level lab sink northwest corner	2.34	0.60	0.51					
SA1SS305XX	Stainless steel piping trench below UST area	0.98	0.42	0.57					
SA1SS306XX	Stainless steel piping trench junction of low level sink and UST drain lines	0.68	0.39	0.59					
SA1SS307XX	Stainless steel piping trench below low level lab sink northeast corner	0.72	0.42	0.64_					
SA1SS308XX	Stainless steel pipe trench beneath low level lab cabinet area	1.69	0.48	0.47					
SA1SS309XX	Cast Iron piping trench beneath emergency shower drain area	6.81	0.89	0.60					
SA1SS310XX	Stainless steel/cast iron common trench approximately 4 ft east of emergency shower drain	4.23	0.95	0.56					
SA1\$\$311XX	Stainless steel/cast iron common trench approximately 8 ft east of emergency shower drain	4.60	1.00	0.60					
SA1SS301XD	Stainless steel piping trench below high level lab sink - Duplicate	0.05	0.39	0.67					
SA1SS309XD	Cast Iron piping trench beneath emergency shower drain area - Duplicate	3.27	0.81	0.63%					
SA1SS311XD	Stainless steel/cast fron common trench approximately 8 ft east of emergency shower drain	1.03	0.40	0,52					

:

LOCATION DESIGNATION	DESCRIPTION OF LOCATION
1A-1	High Level Lab northwest corner on wall 0.48 meters above floor
1A-2	High Level Lab west wall 0.61 meters above floor
1A-3	High Level Lab west wall 0.61 meters above floor
1A-4	High Level Lab north wall 1.78 meters above floor
1A-5	High Level Lab south wall 0.3 meters above floor
1A-6	High Level Lab floor west side
1A-7	High Level Lab northeast corner on partition between high & low level labs 0.48 meters above floor
1A-8	High Level Lab south wall 1.6 meters above floor
1A-9	High Level Lab floor south side
1A-10	High Level Lab floor north side
1A-11	High Level Lab east partition between high & low level labs 1.78 meters above floor
1A-12	High Level Lab south wall 0.3 meters above floor
1A-13	Low Level Lab floor east side
1A-14	Low Level Lab west partition wall between high & low level labs 0.48 meters above floor
1A-15	Low Level Lab east partition wall between low level lab & counting room 1.0 meters above floor
1A-16	Low Level lab north wall 1.78 meters above floor

ST. ALBANS FINAL STATUS SURVEY REPLICATE SUMMARY SHEET SURVEY UNIT 1A (High Level and Low Level Labs & Isotope Storage Area)										
	1 MINUTE DIREC MEASUREMENT RES COUNTS		NT RESULT, TOTAL SR-90			ETA SMEAR S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY			
Location Designation	Surface	Amblent Background ⁽¹⁾	Count	DPW100cm ²	Background Sample Count (2 (cpm) min)		DPM/100cm ²			
1A-5XD	Wali	153	233 .	352	82.65	179	14			
1A-9XD	Floor (Soil)	215	284	303	82.65	185	20			
1A-15XD	- Wall_	179	222	189	82.65	143	00			
Date:	01/16/01									
Surveyor:	Edmond Young			·			į.			

Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

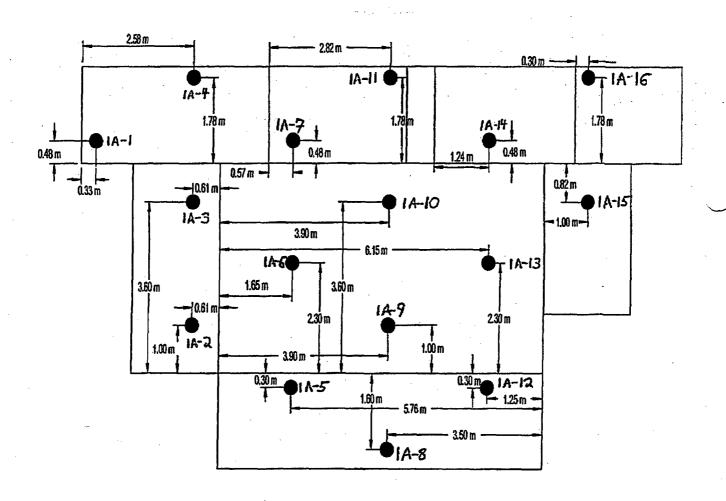
Instrument Efficiency: 0.2275

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322 Instrument Efficiency: 0.486

HIGH LEVEL AND LOW LEVEL LABS & ISOTOPE STORAGE AREA

Survey Unit 1A



	SURVEY UNIT 1B (Counting Room, Wash Room & Corridor 15)								
Map Locator	SOIL SAMPLE DESIGNATION	COLLECTION LOCATION DESCRIPTION							
0	SA1SS312XX	Stainless steel/cast iron common trench approximately 12 ft east of emergency shower drain							
P	SA1SS313XX	Stainless steel/cast iron common trench crossing corridor 15 ramp north side							
Q ·	SA1SS314XX	Stainless steel/cast iron common trench crossing corridor 15 ramp south side							
R	SA1SS315XX	Cast iron common trench piping trench beneath distillation sink area in closet							
S	SA1SS314XD	Stainless steel/cast iron common trench crossing corridor 15 ramp south side - Duplicate							

SURVEY UNIT 1B (Counting Room, Wash Room & Corridor 15)								
SOIL SAMPLE DESIGNATION	COLLECTION LOCATION DESCRIPTION	Sr-80 ACTIVITY CONCENTRATION (pC!/g)	TOTAL UNCERTAINTY +/- 2 or (pCl/g)	MDC (pCl/g)				
			·					
SA1SS312XX	Stainless steel/cast Iron common trench approximately 12 ft east of emergency shower drain	1.27	0.47	0.59				
\$A1\$8313XX	Stainless steel/cast iron common trench crossing corridor 15 ramp north side	0.33	0.36	0.60				
SA1SS314XX	Stainless steel/cast iron common trench crossing corridor 15 ramp south side	2.14	0.59	0.57				
SA1SS315XX	Cast Iron common trench piping trench beneath distillation sink area in closet	0.05	0.41	0.71				
SA1SS314XD	Stainless steel/cast fron common trench crossing comidor 15 ramp south side - Duplicate	6.60 ·	1.40	0.60				

LOCATION DESIGNATION	DESCRIPTION OF LOCATION							
1B-1	Corridor 15 floor near entrance from corridor 45							
1B-2	Corridor 15 north wall (near entrance from corridor 45) 1.65 meters above floor							
1B-3	Corridor 15 south wall 0.4 meters above floor							
1B-4	Corridor 15 north wall 0.2 meters above floor							
1B-5	Corridor 15 south wall 1.85 meters above floor							
1B-6	Corridor 15 floor							
1B-7	On south side of partition wall between counting room & low level lab 1.04 meters above floor							
1B-8	Corridor 15 north wall 1.65 meters above floor							
1B-9	Corridor 15 south wall 0.4 meters above floor							
1B-10	Counting room floor southwest corner							
1B-11	Counting room floor northwest corner 0.18 meters from partition wall							
1B-12	On east side (narrow portion bet, corridor & counting room) of corridor 15 north wall 0.2 meters above floor							
1B-13	Corridor 15 southeast corner on south wall 1.85 meters above floor							
1B-14	Corridor 15 floor washroom (formerly w/sink)							
1B-15	Counting room floor east side							
1B-16	Counting room northeast corner on north wall 0.76 meter above floor							
1B-17	Counting room south wall next to entrance between counting room & corridor 15, 1.65 meters above floor							

	SUR	VEY UNIT 1B (C	ounting Ro	om, Wash Room & Co	rridor 15)		
	1 MINUTE DIRECT MEASUREMENT RESULT, COUNTS		DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY	SR-90 BI RESULT	TRANSFERABLE SR-90 SURFACE ACTIVITY		
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
1B-6XD	Floor	166	272	466	82.65	153	0
. 1B-15XD	Floor	155	235	352	82.65	160	0
1B-17XD	Wall	158	167	40	82,65	162	0
Date:							
Survevor:	Edmond Young	1			l .	1	

Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

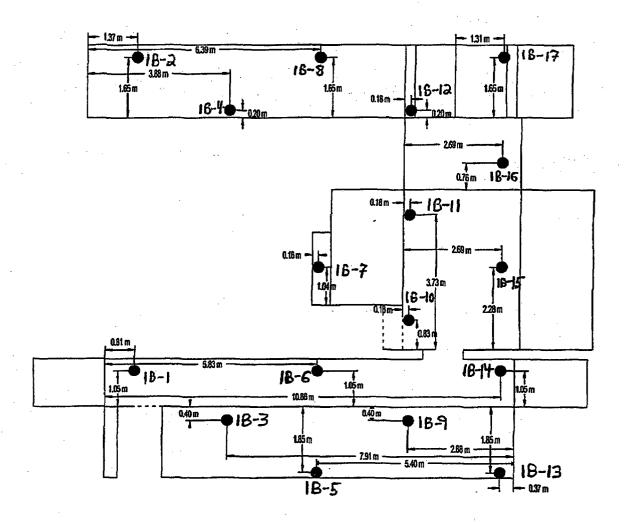
Instrument Efficiency: 0.2275

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322 Instrument Efficiency: 0.486

COUNTING ROOM, WASH ROOM & CORRIDOR 15

Survey Unit 1B



LOCATION	
DESIGNATION	DESCRIPTION OF LOCATION
2-1	Ejector Pit lower level west wall 1.78 meters above floor
2-2	Ejector Pit lower level northwest corner on west wall 1.78 meters above floor
2-3	Ejector Pit entry level floor on west wall 1.78 meters above floor
2-4	Ejector Pit lower level southwest corner of south wall 1.85 meters above floor
2-5	Ejector Pit lower level southwest comer of floor
2-6	Ejector Pit lower level west side of floor
2-7	Ejector Pit lower level northwest corner on north wall 0.89 meters above floor
1	
2-8	Ejector Pit entry level floor next to west wall on floor
2-9	Ejector Pit lower level underside of entry level floor 1.58 meters from north wall
2-10	Ejector Pit lower level south wall 0.70 meters above floor
2-11	Ejector Pit lower level east side of floor
2-12	Ejector Pit lower level northeast corner of floor
2-13	Ejector Pit entry level floor next to railing on floor
2-14	Ejector Pit entry level floor on north wall 0.13 meters above floor
2-15	Ejector Pit lower level underside of entry level floor 0.43 meters from north wall
2-16	Ejector Pit lower level southeast corner on east wall 1.28 meters above floor
2-17	Ejector Pit lower level east wall 1.28 meters above floor
2-18	Ejector Plt entry level floor on east wall 1.28 meters above floor

				/EY REPLICATE S (Ejector Pit room)	. •		
	DIRECT 1 MINUTE DIRECT MEASUREMENT MEASUREMENT TOTAL SR-90 SR-90 BETA SI RESULT, COUNTS SURFACE ACTIVITY RESULTS, COI		MEASUREMENT		· ·	TRANSFERABLE SR-90 SURFACE ACTIVITY	
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
2-6XD	Floor	159	206	207	82.65	178	13
2-8XD	Floor	180	293	497	82.65	173	. 8
2-10XD	Wall	158	227	303	82.65	148	0
Date:	01/16/01						. <u>. </u>
Surveyor.	Edmond Young						

⁽¹⁾ Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

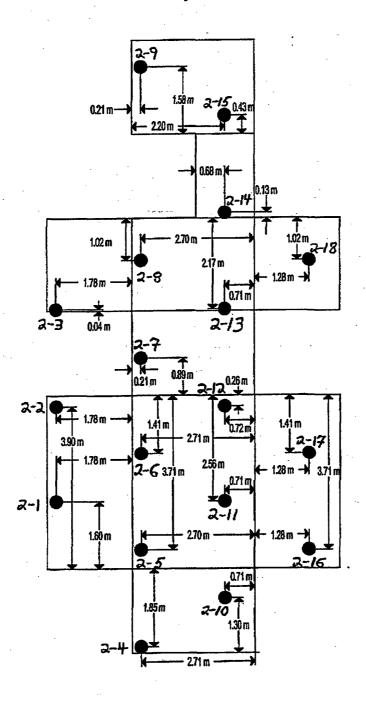
Instrument Efficiency: 0.2275

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322 Instrument Efficiency: 0.486

FIGURE 6-7 EJECTOR PIT ROOM

Survey Unit 2



LOCATION DESIGNATION	DESCRIPTION OF LOCATION
4-1	Southwest corner of west wall 0.94 meters above floor
4-2	Middle of west wall 0.94 meters above floor
4-3	Northwest comer of west wall 0.94 meters above floor
4-4	Floor south side near entrance
4-5	Floor north side
4-6	Northwest corner of north wall 0.41 meters above floor
4-7	Southeast comer on east wall of entrance 0.34 meters above floor
4-8	Northeast corner on east wall of entrance 0.34 meters above floor
4-9	Floor near north wall
4-10	North wall 1.26 meters above floor
4-11	South wall next to former stall area 1.04 meters above floor
4-12	East wall of entrance 1.81 meters above floor
4-13	East wall of former stall area 0.15 meters above floor
4-14	East wall of former stall area 1.62 meters above floor
4-15	Ceiling ventilation grate west side
4-16	Ceiling ventilation grate east side

	ST. ALBANS			EY REPLICATE (Men's Toilet)	SUMMARY	SHEET	
		1 MINUTE D MEASUREMENT COUNT	r RESULT,	DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY		TA SMEAR S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
4-4XD	West Floor	197	258	268	82.65	153	0
4-6XD	North Wall	199	271	316	82.65	151	0
4-14XD	East Wall	216	401	813	82.65	168	3

⁽¹⁾ Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Date:

01/16/01

Surveyor: Edmond Young

Direct Scan:

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

Instrument Efficiency: 0

0.2275

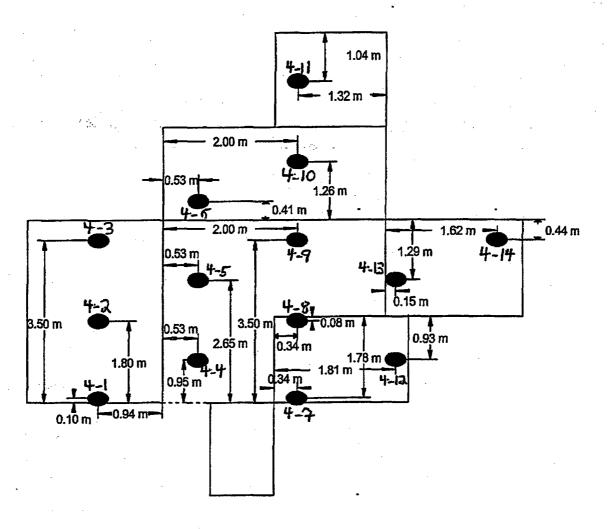
Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.4

U.486

Survey Unit 4



LOCATION DESIGNATION	DESCRIPTION OF LOCATION
DESIGNATION	DESCRIPTION OF LOCATION
5-1	Corridor South Wall opposite entrance to lab
5-2	Not accessible - use door to lab entrance 0.59 meters above right hand lower corner of door
5-3	Corridor 45 floor
5-4	Corridor South Wall next to ejector pit entrance
5-5_	Corridor North Wall opposite ejector pit entrance
5-6	Corridor 45 floor
5-7	Foyer floor next to shield wall outside entrance to x-ray treatment room
5-8	X-ray treatment room west wall 0.81 meters above floor
5-9	X-ray treatment room south wall 1.5 meters above southwest corner of floor
5-10	X-ray control room north wall 0.15 meters above floor
5-11	X-ray control room floor
5-12	X-ray treatment room floor
5-13	X-ray treatment room north wall 0.5 meters above floor
5-14	X-ray control room south wall 1.85 meters above southeast corner of floor
5-15	X-ray control room floor
5-16	X-ray treatment room floor
5-17	X-ray treatment room south wall 1.5 meters above southeast corner of floor

				EY REPLICATE SI			
SURVEY L	INIT 5 (Corrido	r 45, Treatment U	nit & Asso	ciated Equipment Roo	m, and Foyer	at Foot of Stairs)
		1 MINUTE D MEASUREMEN COUNT	r result,	DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY		ETA SMEAR S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY
Location Designation	Surface	Amblent Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
5-3XD	Floor	196	220	105	82.65	147	0
5-6XD	Floor	170	209	171	82.65	173	8
5-8XD	Wall	271	550	1226	82.65	147	0
Date:	01/16/01						
Surveyor:	Edmond Young						

Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

Instrument Efficiency:

Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

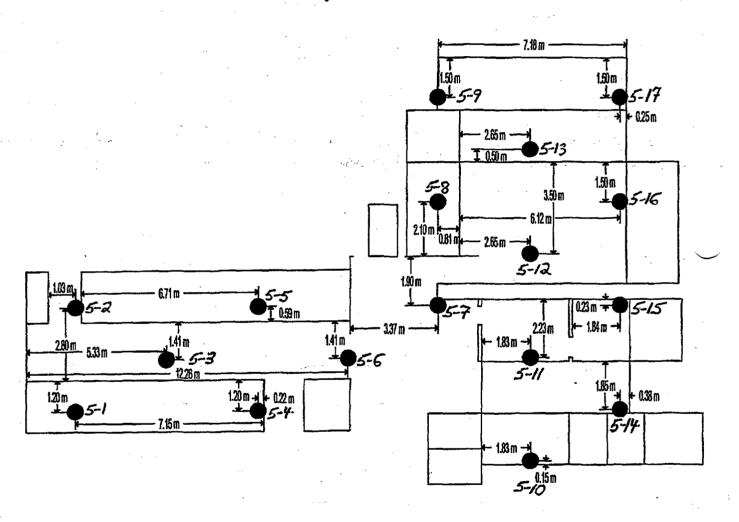
Instrument Efficiency:

Map Locator	SOIL SAMPLE DESIGNATION	COLLECTION LOCATION DESCRIPTION	
indp zoodto:		OCCUPATION WOOM TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TO	- Y
T	SA5SS301XX	Stainless steel/cast iron common trench crossing corridor 45 north side	<i>i</i> .
U	SA5SS302XX	Stainless steel/cast iron common trench crossing corridor 45 center	٠,
V	SA5SS303XX	Stainless steel/cast iron common trench crossing corridor 45 south side	
W	SA5SS302XD	Stainless steet/cast iron common trench crossing corridor 45 center - Duplicate Sample	

	SURVEY UNIT 5 (Corridor 45, Treatment Unit and Associated Equipment Room, and Foyer at Foot of Stairs)								
SOIL SAMPLE DESIGNATION	COLLECTION LOCATION DESCRIPTION	SI-90 ACTIVITY CONCENTRATION (pCi/g)	TOTAL UNCERTAINTY +/- 2 σ (pCHg)	MDC (pCl/g)					
SA599301XX	Stainless steel/cast iron common trench crossing corridor 45 north aide	-0.02	0.35	0.62					
SA5SS302XX	Stainless steel/cast iron common trench crossing corridor 45 center	0.04	0.42	0.72					
SA5SS303XX	Stainless steel/cast iron common trench crossing corridor 45 south side	0.47	0.40	0.65					
SA5SS302XD	Stainless steel/cast Iron common trench crossing corridor 45 center - Duplicate Sample	-0.07	0.31	0.54					

FIGURE 6-4 CORRIDOR 45, TREATMENT UNIT AND ASSOCIATED EQUIPMENT ROOM, AND FOYER AT FOOT OF STAIRS

Survey Unit 5



LOCATION DESIGNATION	DESCRIPTION OF LOCATION
8A-1	X-ray shield wall outside surface
8A-2	X-ray shield wall outside surface
8A-3	X-ray shield wall outside surface
8A-4	North wall 0.9 meters above floor in northeast corner
8A-5	East floor next to X-ray shield wall
8A-6	Southeast corner on floor near wall
8A-7	South wall 1.73 meters above floor
8A-8	North portion of floor 1.0 meter from wall
8A-9	Center of room on floor
8A-10	South portion of floor near wall
8A-11	Wall on south side of room behind stairs to lower level 0.9 meter above floor
8A-12	Wall on east side stairs to lower level, north corner 0.33 meter above floor
8A-13	Wall on east side stairs to lower level, south corner 0.33 meter above floor
8A-14	South wall 0.26 meters above floor
8A-15	Wall in southwest corner of room 1.15 meters above floor

		SURVEY UNIT 8A	(Drum Sto	rage Above Machine F	Room)		
		1 MINUTE D MEASUREMENT COUNT	result,	DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY		ETA SMEAR S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY
Location Designation	Surface	Ambient Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
8A-9XD	Floor	124	188	281	79.55	160	1
8A-10XD	Floor	161	205	193	79.55	165	6
8A-13XD	Wall	150	190	176	79.55	172	13
Date:	01/26/2001				·		
Surveyor	Edmund Young			,			

Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Removable Contamination:

Instrument Used: L2224 serial # 162420 / 43-89 scintillation probe # 171381

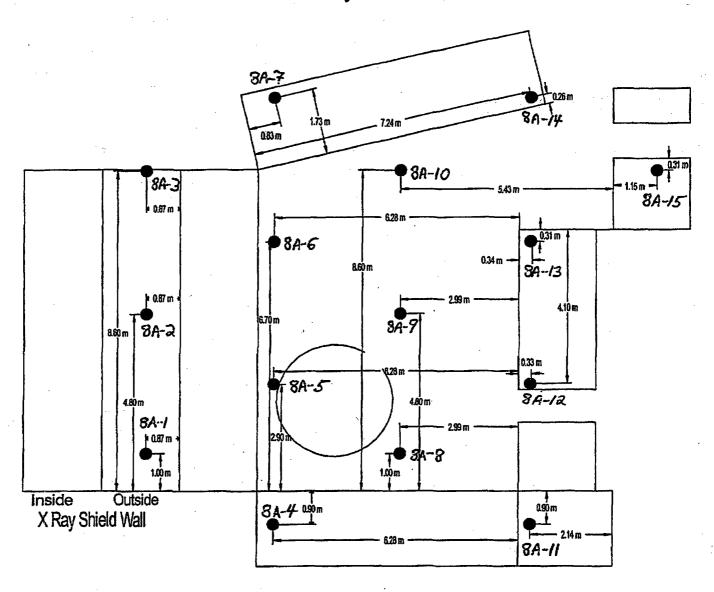
Instrument Efficiency: 0.2275

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.486

SECONDARY RADMATERIAL STORAGE AREA ABOVE X-RAY MACHINE

Survey Unit 8A



• *		
,		
		•
LOCATION		
LOCATION		;
DESIGNATION	DESCRIPTION OF LOCATION	
8B-1		
	North wall 1.65 meters above floor in northeast corner	
8B-2	Northeast side of floor near doorway	
8B-3	East side of floor next to wall	
8B-4	Southeast side of floor near doorway	
8B-5	On south wall 1.86 meters above the floor	
8B-6	North portion of floor next to wall	
8B-7	North middle section of floor	
8B-8	South middle section of floor	
8B-9	South portion of floor near wall	
8B-10	North wall 1.66 meters above floor in northwest corner	
8B-11	Northwest side of floor near wall	
8B-12	West side of floor near wall	
8B-13	Southwest side of floor near wall	
. 8B-14	On south wall 1.84 meters above the floor	

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		SURVEY UN	IT 8B (Rac	Material Storage Area)		
		1 MINUTE DI MEASUREMENT COUNT	RESULT,	DIRECT MEASUREMENT TOTAL SR-90 SURFACE ACTIVITY	RESULT	ETA SMEAR S, COUNTS	TRANSFERABLE SR-90 SURFACE ACTIVITY
Location Designation	Surface	Amblent Background ⁽¹⁾	Count	DPM/100cm ²	Background (cpm)	Sample Count (2 min)	DPM/100cm ²
8B-1XD	. Wall	182	203	92	79.55	167	8
8B-3XD	Floor	167	196	127	79.55	141	0
8B-8XD	Floor	172	210	167	79.55	156	0
Date:	. 01/26/2001						
Surveyor:	Edmund Young						•

⁽¹⁾ Background measurement performed using a wooden shield (i.e., result represents only gamma component)

Instrument Used; L2224 serial # 162420 / 43-89 scintillation probe # PR-171381

Instrument Efficiency: 0.2275

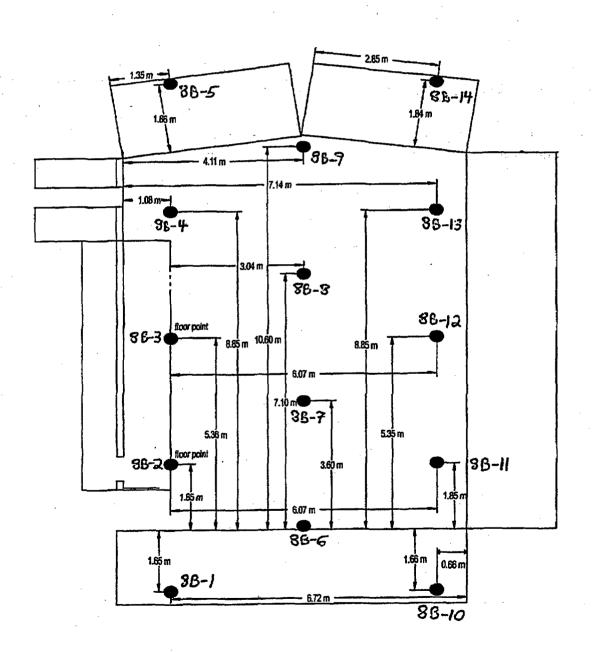
Removable Contamination:

Instrument Used: L2929 serial # 163827 / 43-10-1 alpha beta sample counter # 171322

Instrument Efficiency: 0.486

RADMATERIAL STORAGE AREA

Survey Unit 8B



Appendix C:

Scan MDC Calculations

1.0 INTRODUCTION

Cabrera Services, Inc. (CABRERA) will perform a Final Status Survey (FSS) of select buildings on the St. Albans Veterans Administration Extended Care Center Facility (VAECC) property located in Queens, New York. The FSS is designed in accordance with guidance from the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). The number of samples required per survey unit depends upon the scan sensitivity or scan minimum detectable concentration of the instrumentation used and is a critical factor in developing FSS design. The scan MDC can be estimated by using the methodology in MARSSIM Section 6.7.2.1. This document provides the technical basis for estimating the scan MDC for beta radiation using a Ludlum Model 43-89 detector or equivalent coupled to a ratemeter. The type of ratemeter used has no bearing on calculating scan MDC.

1.1 Objective

The specific objective of this technical memorandum is to estimate the scan MDC of a plastic scintillator to measure beta emitters on selected structural materials in the buildings on the VAECC property during remedial and FSS activities. This is accomplished utilizing the methodology and approach documented in MARSSIM (Section 6.7.2.1) for scanning of beta emitters. It is important to note that this document is solely to be used to estimate scan MDC prior to conducting surveys on the VAECC property.

2.0 ESTIMATION OF MINIMUM DETECTABLE COUNT RATE (MDCR)

The MDCR is dependent upon several factors including surveyor performance, instrument sensitivity, distribution of contamination, etc.

2.1 Determination of Number of Source Counts

The MDCR is calculated by obtaining the minimum detectable number of source counts (S_i) in a given time interval, i. S_i is calculated by using equation 6-8 in MARSSIM as:

$$S_i = d' \sqrt{b_i}$$

where, d' = is the detectability value associated with the desired performance selected from Table 6-5 in MARSSIM

 $b_i = background counts$

The number of background counts will fluctuate with the type of structural material due to the varying concentration of naturally occurring radioactive material present. A government subcontractor performed a radiation survey of buildings in Maywood, New Jersey in March of 1998 (USACE 1998). During that effort, a local fire station and Building #52 were used to obtain expected background responses from concrete, concrete block, and brick. The average and maximum count rates for each of these materials, as determined during the 1998 survey, are listed in Table 1. The listed values are assumed to be representative of background count

rates that will be observed during the FSS of the VAECC building. Based upon manufacture specifications for both of these instrument types, it is also assumed that the response of the Ludlum Model 43-89 will be comparable to that of the Eberline AB-100 used during the 1998 survey.

Table 1. Average and Maximum Background Count Rates for Select Material from 1998 Survey.

Material								
	Brick	Concrete Block	Concrete Floor	Concrete Wall				
Average Count Rate (cpm)	606	387	341	365				
Maximum Count Rate (cpm)	822	514	549	537				

Since the average and the maximum count rates for each of the concrete materials are similar in value, it is assumed that any concrete material will exhibit approximately the same background count rate. Therefore, an MDCR is calculated for brick and concrete only and the MDCR for concrete will be applied to concrete floors, concrete walls, concrete block, etc. To be conservative, the maximum background count rate for the two materials is chosen as the expected background count rate (822 cpm for brick and 549 cpm for concrete). This is considered conservative because it will result in a higher scan MDC.

It is assumed that during a typical scanning survey an elevated source of radioactivity will remain under the probe for one second. The width of the detector is 10 cm. This corresponds to a scan speed of 10 cm per second. Therefore, the number of background counts in the observation interval of one second when scanning concrete material is calculated as:

$$b_i = (549 \text{ cpm} \left\{ \frac{1 \text{sec.}}{60 \frac{\text{sec.}}{\text{min}}} \right\} = 9.15 \text{ counts}$$

The value of d' is selected from Table 6.5 in MARSSIM and is based upon the acceptable true and corresponding false positive proportions or rates during scanning. For example, if a 95% confidence level is placed on the ability to correctly detect the presence of radioactivity above background, then there is only a 5% chance that radioactivity above background will be missed. Further, if a 25% confidence level is placed on falsely identifying areas as containing radioactivity above background, then 75% of the time areas not containing radioactivity above background will be correctly determined as background. For the purposes of the FSS work plan, a 95% confidence level will be used for correctly detecting the presence of radioactivity, with an allowance for 25% false positive detection. The value for d' in Table 6-5 of

MARSSIM for these confidence levels is 2.32. Therefore, the minimum number of source counts, when scanning concrete material, is calculated as:

$$S_1 = 2.32 \sqrt{9.15} = 7.02 \text{ counts}$$

2.2 Calculation of MDCR

The MDCR is calculated by using equation 6-9 in MARSSIM.

$$MDCR = S_i \frac{60}{i}$$

When a scanning survey is performed, the surveyor will investigate potential locations that exhibit elevated count rates to determine if the location contains radioactivity above background. It is assumed that a surveyor typically stops the probe over a suspect location for four seconds before making a decision as to whether or not radioactivity above background is present. Therefore, when scanning concrete material, the MDCR is calculated as:

MDCR =
$$(7.02 \text{ cpm}) \left(\frac{60 \text{ sec.}}{4 \text{ sec.}} \right) = 105.3 \text{ cpm}$$

3.0 ESTIMATION OF SCAN MDC

The scan MDC is determined from the Minimum Detectable Count Rate (MDCR), by applying necessary conversion factors that account for surveyor performance, detector efficiency, probe area, etc. The scan MDC is calculated by using equation 6-10 in MARSSIM as:

Scan MDC =
$$\frac{\text{MDCR}}{\sqrt{p} \in_{j} \in_{s}} \frac{\text{probe area}}{100 \text{ cm}^{2}}$$

where, MDCR = minimum detectable count rate

 ε_i = instrument efficiency

 $\varepsilon_{\rm s} = {\rm surface\ efficiency}$

p = surveyor efficiency,

The Nuclear Regulatory Commission publication NUREG-1507 recommends surveyor efficiency values between 0.75 and 0.5. To be conservative, 0.5 is chosen. Ludlum Measurements, Incorporated lists the efficiency for the Model 44-116 probe for Tc-99 as 15%, which is the value used in the following calculation. The listed efficiency for the Model 43-89 for Sr-90 is 16%, which would cause a slightly conservative result. This efficiency is assumed as the combined surface and instrument efficiency listed above. The probe area of

the Model 43-89 is 126 square centimeters. The Scan MDC for concrete material is thus calculated as:

Scan MDC =
$$\frac{105.3 \text{ cpm}}{\sqrt{0.5} \left(0.15 \frac{\text{c}}{\text{d}} \right) \left(\frac{126 \text{ cm}^2}{100 \text{ cm}^2} \right)} = 788 \text{ dpm}$$

Having a percentage of false positives does not require sampling, but rather further investigation by either slowing the scan speed in the location of interest or performing an integrated count. A higher false positive value is actually conservative because background locations are investigated as though they contained residual radioactivity. The ramification of increasing the false positive proportion is that survey scanning time is slightly increased.

The above calculation was repeated for calculation of the scan MDC for brick material. However, due to the greater background count rate exhibited from brick, a false positive proportion of 35% must be used to achieve the DCGL of 855 dpm and 60% in order to achieve the DCGL of 590 dpm when surveying brick material.

4.0 SUMMARY

Using MARSSIM methodology, the calculated scan MDCs for a 43-89 scintillation detector employed for this radiological survey is:

- For concrete material, the scan MDC is 788 dpm/100cm² when using a 25% false positive and a 95% correct detection. When the false positive is adjusted to 50%, a scan MDC of 557 dpm/100cm² is achieved.
- For Brick material, the scan MDC is 839 dpm/100cm² when using a 35% false positive and a 95% correct detection. When the false positive is adjusted to 60%, a scan MDC of 573 dpm/100cm² is achieved.

Appendix D:

Static Measurement MDC Calculations

1.0 INTRODUCTION

The St. Albans Veterans Administration Extended Care Center (VAECC) housed a nuclear medicine operation at the facility. This facility had laboratory research performed under an NRC "Possession Only" byproduct materials license during the 1960s. Several areas of the facility have elevated levels of Sr-90 surface contamination and volumetric material concentrations. The facility will be decommissioned which will entail the use of field health physics instruments.

1.1 OBJECTIVE

The objective of this technical memorandum is to calculate the minimum detectable concentration (MDC) for the health physics field instrument(s) used during cleanup. The contaminant of concern (COC), Sr-90, is used for the MDC calculations.

2.0 MINIMUM DETECTABLE CONCENTRATION

The detection limits for field survey instruments are an important criterion to assure that proper instrumentation is chosen for the field measurements to be taken. The MDC is the minimum activity concentration, at a given confidence level, that the instrument is able to detect. It is dependent upon the instrument efficiency, the background, and count time of the sample and background.

There are numerous MDC expressions (NRC 1997a) and (NRC 1997b) that may be utilized. This technical memorandum utilizes the more recent expressions presented in Table 3.1 of (NRC 1997a) and Equation 6-7 of (NRC 1997b). The MDC formulas listed from Brodsky & Gallaghar and by Strom & Stansbury in (NRC 1997a) are equivalent and simplify to the former expression when the background count time and the sample count time are equal to 1 minute. Equation 6-7 of (NRC 1997b) has a separate term, C, showing more clearly the detector efficiency variable and other factors used to convert MDC counts to concentration. This expression, with a 1 minute field background and sample count time is used as the basis for all calculations in this memorandum.

3.0 MINIMUM DETECTABLE CONCENTRATION CALCULATION

3.1 Minimum Detectable Concentration Expression

The MDC expression from (NRC 1997b) based on 95 % confidence, and 1minute count and background time is:

$$MDC = C \times \left(3 + 4.65\sqrt{B}\right)$$

Where,

C = Detector Efficiency, dpm/count

B = Background Count - 1 Minute, counts

3.2 Detection Equipment

A gas proportional counter such as the Eberline 43-68 or equivalent provides a highly sensitive detector for detecting beta emissions. The manufacturer provides a beta efficiency of 0.30 counts per disintegration for Sr-90/Y-90. This is similar to the gas proportional detector efficiency for Sr-90/Y-90 listed in (NRC 1997a) of 0.34 counts per disintegration.

Background is a variable in the MDC expression. Manufacturer data indicates a "typical" background for a gas proportional detector of 350 counts per minute when detecting beta. Data from (NRC 1997a) shows a similar background of 354 counts per minute for the gas proportional detector when detecting beta. This background is based upon an ambient gamma background of approximately $10~\mu\text{R/hr}$.

A gas proportional detector will normally provide a greater efficiency for detection of beta radiation and therefore a lower MDA than other field instruments. However, these instruments will also have a higher background due to ambient gamma background. Additionally, these detectors are required to have a counting gas (P-10) that requires supply lines from the gas supply to the detector. This may become unwieldy in the field.

An alternative is to utilize a scintillation detector that requires no special counting gas and provides field flexibility with lower background contribution. Manufacturer data indicates a "typical" background for a beta scintillation detector of 300 -350 counts per minute. The efficiency for such detectors is 0.20 counts per disintegration for Sr-90/Y-90.

Since the surface being measured is concrete in a below grade level basement facility, the detector background will depend significantly on the beta and gamma background at the site. Constituents in the concrete such as aggregate may change the background substantially. Data is presented in an MDC table to illustrate the variability of MDC with background.

3.3 Results

3.1.1 Surface MDC

Table 1 lists the MDC values for a gas proportional detector in terms of disintegrations per 100 cm² and pCi per 100 cm² based on background rates varying from 350 to 1000 counts per minute. Table 2 lists the corresponding MDC values for a PhoSwich scintillation detector.

3.1.2 Estimated Volumetric MDC

Assume the surface is contaminated to a depth in excess of the maximum range of a Y-90 beta particle in concrete (0.468 cm max range; RAD 1970) having a density of 2.35 g/cm³. It is further assumed that 100% of the beta particles originating from a depth of less than 0.0468 cm (one-tenth of the maximum range of the Y-90 beta) below the concrete surface and that are emitted in the direction of the detector are detected. None of the beta particles emanating from a location deeper than 0.0468 cm from the surface of the concrete reach the detector. Assuming

uniform distribution of any contamination in this thin slab of "near surface" concrete and adjusting for the density of concrete (2.35 g/cm³) results in a total mass of contaminated concrete of:

$$100 \text{ cm}^2 \text{ x } 0.047 \text{ cm x } 2.35 \text{ g/cm}^3 = 11 \text{ g}$$

A simplified estimate of the volumetric concentration activity MDA may be made by dividing the areal concentration MDA by this thin section of concrete representing one tenth of the maximum range of Y-90 beta particles in the concrete. Table 3 lists this estimate of volumetric concentration activity as a function of background and detector.

4.0 CONCLUSION

A gas proportional detector is expected to have a field MDC of 300 dpm/100 cm² at typical background levels as provided by the equipment manufacturer.

A beta scintillation detector is expected to have a field MDC of 418 dpm/100cm² at typical background levels as provided by the equipment manufacturer.

Field MDCs for Sr-90/Y-90 are expected to range from 300 to 750 dpm/100cm² depending upon the detector and background rates experienced in the field. The corresponding estimated field volumetric MDCs are expected to range from 11 to 31 pCi/g.

TABLE 1

MDC VERSUS BACKGROUND FOR GAS PROPORTIONAL DETECTOR

Efficiency Factor, C (DPM/Count)	Background, B (Counts)	MDC Result (DPM/100 cm²)	MDC Result (pCI/100 cm²)
3.33	350	300	135
3.33	400	320	144
3.33	500	356	160
3.33	600	389	175
3.33	700	420	189
3.33	800	448	202
3.33	900	475	214
3.33	. 1000	500	225

TABLE 2

MDC VERSUS BACKGROUND FOR BETA

SCINTILLATION DETECTOR

Efficiency Factor, C (DPM/Count)	Background, B (Counts)	MDC Result (DPM/100 cm²)	MDC Result (pCl/100 cm²)
5	300	418	188
5	400	480	216
5	500	535	241
5	.600	585	263
5	700	630	284
5	800	673	303
5	900	713	321
5	1000	750	338

TABLE 3

ESTIMATED VOLUMETRIC MDC VERSUS BACKGROUND FOR

GAS PROPORTIONAL AND BETA SCINTILLATION DETECTORS

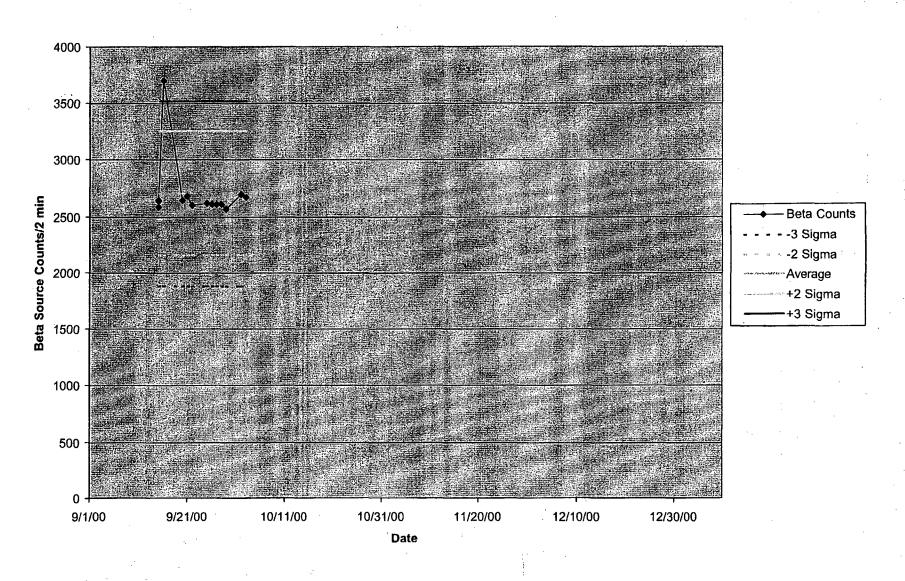
Background, B (Counts)	~Volumetric MDC Gas Proportional, pCi/g	~Volumetric MDC Beta Scintillation, pCi/g
300	11	17
350	12	18
400	13	20
500	15	22
600	16	24
700	17	26
800	18	28
900	· 19	29
1000	20	3 1

REFERENCES

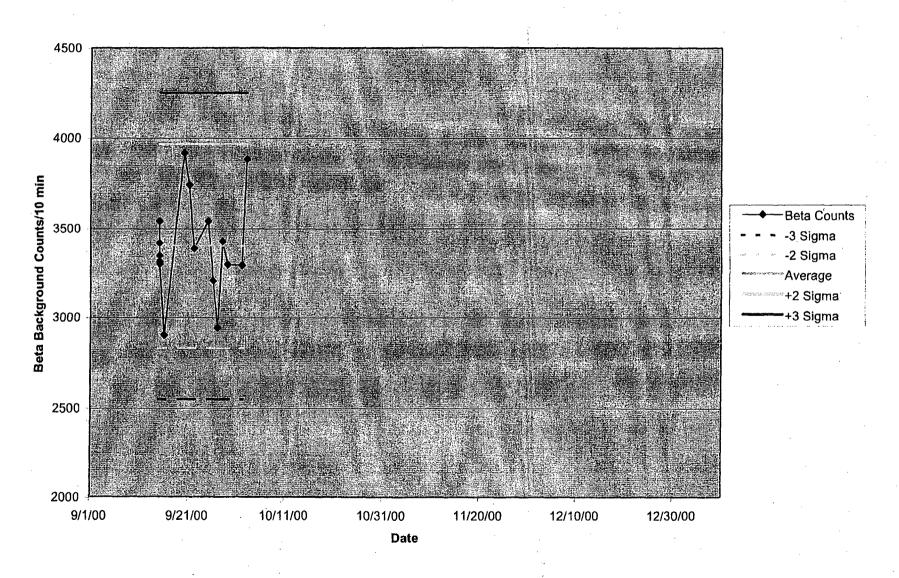
- NRC 1997a NUREG-1507 "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions", December 1997
- NRC 1997b NUREG-1575 "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)", December 1997
- RAD 1970 Radiological Health Handbook, Revised Edition, January 1970

Appendix E: <u>Instrumentation Quality Control Charts</u>

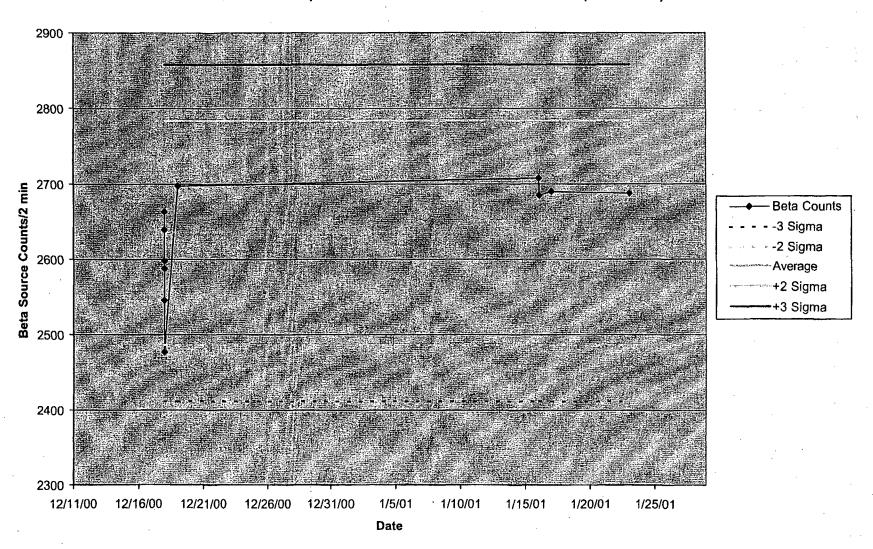
Beta Source Response Control Chart for Ludlum 2221 (SN161581)



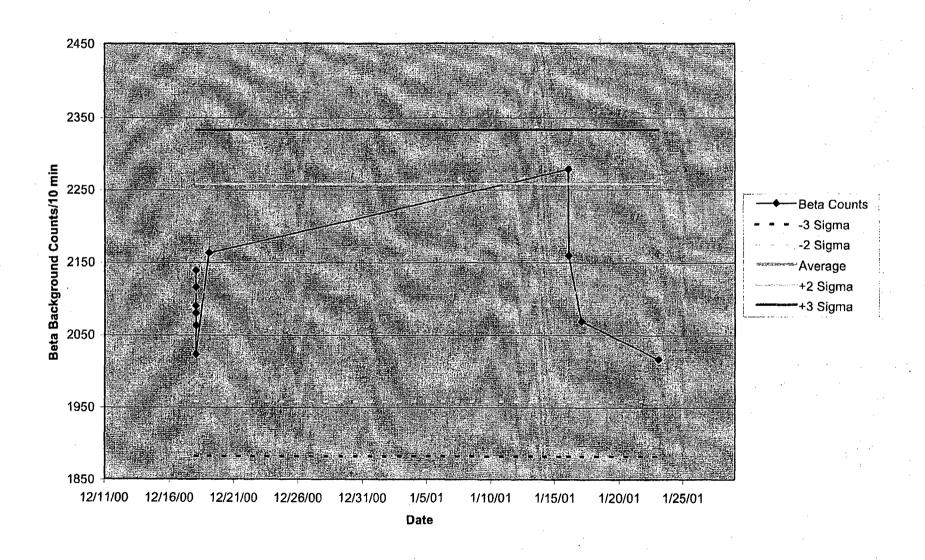
Beta Background Control Chart for Ludlum 2221 (SN161581)



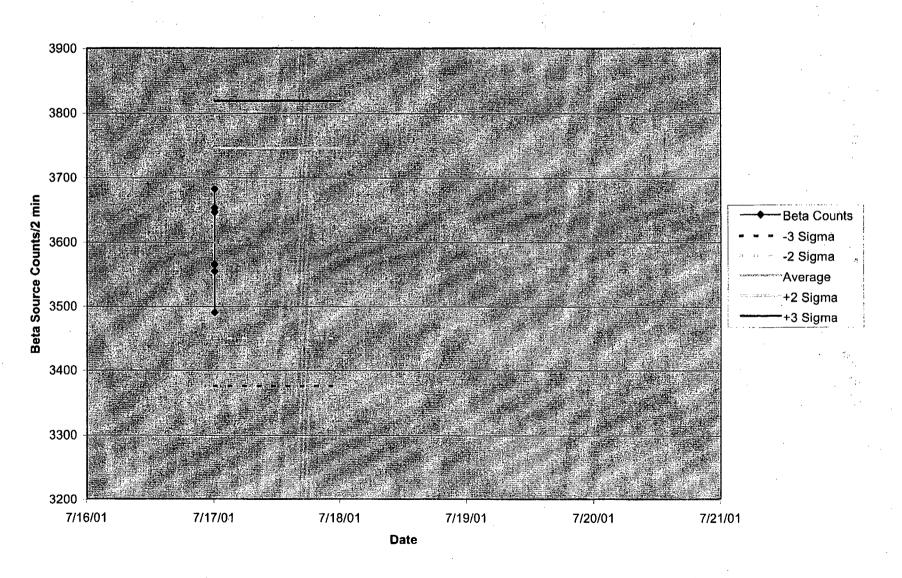
Beta Source Response Control Chart for Ludlum 2224 (SN162420)



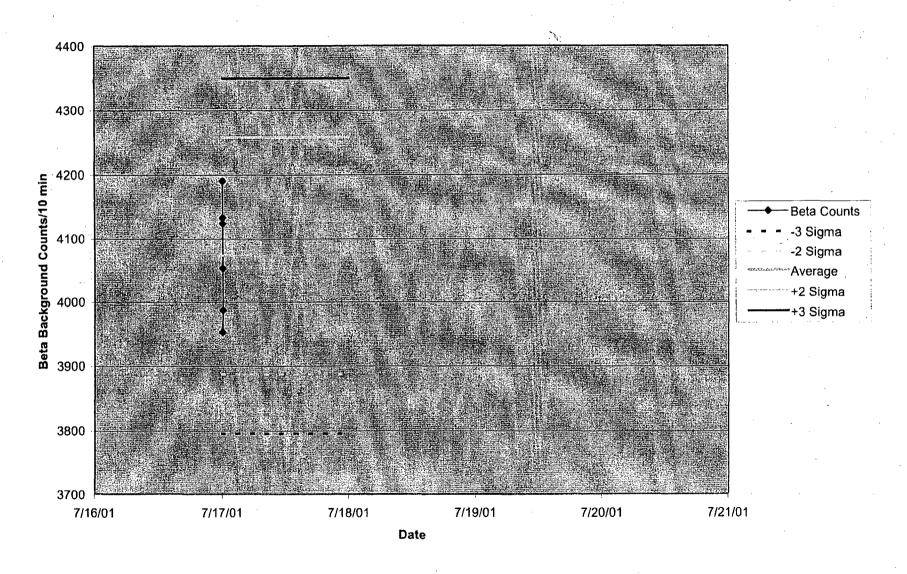
Beta Background Control Chart for Ludium 2224 (SN162420)



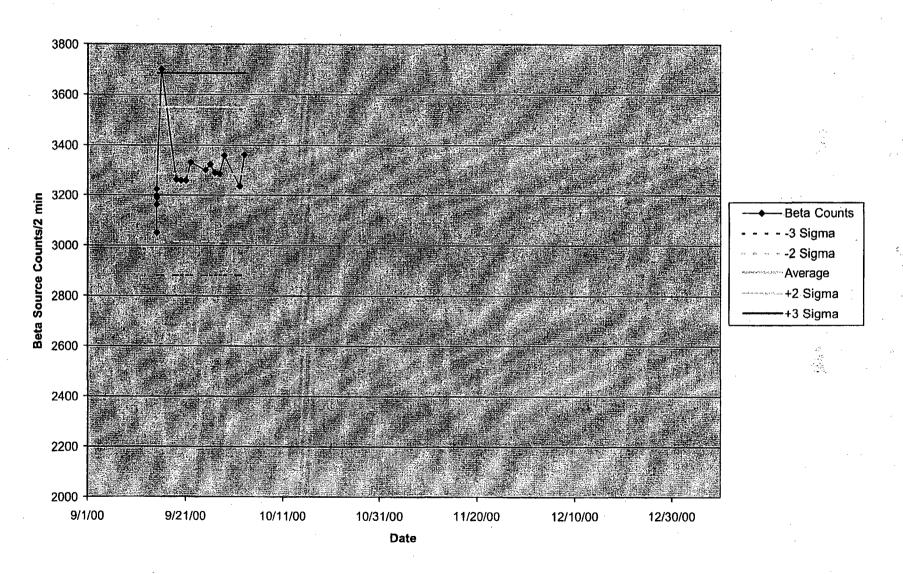
Beta Source Response Control Chart for Ludlum 2224 (SN162426)



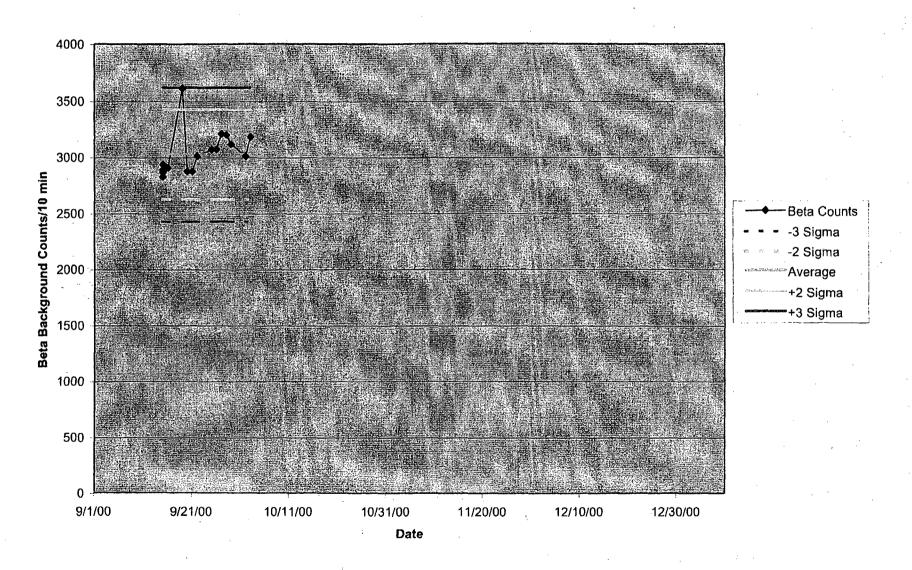
Beta Background Control Chart for Ludlum 2224 (SN162426)



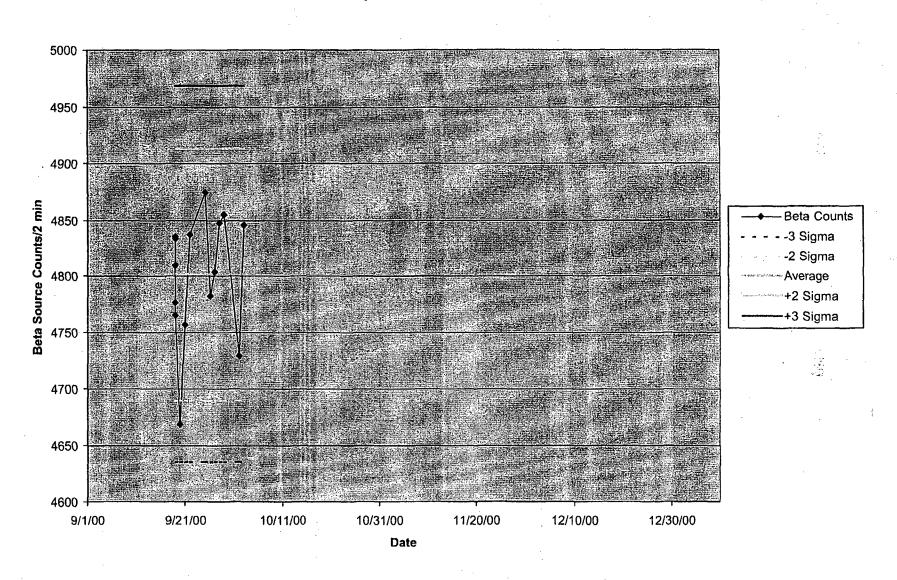
Beta Source Response Control Chart for Ludlum 2221 (SN163673)



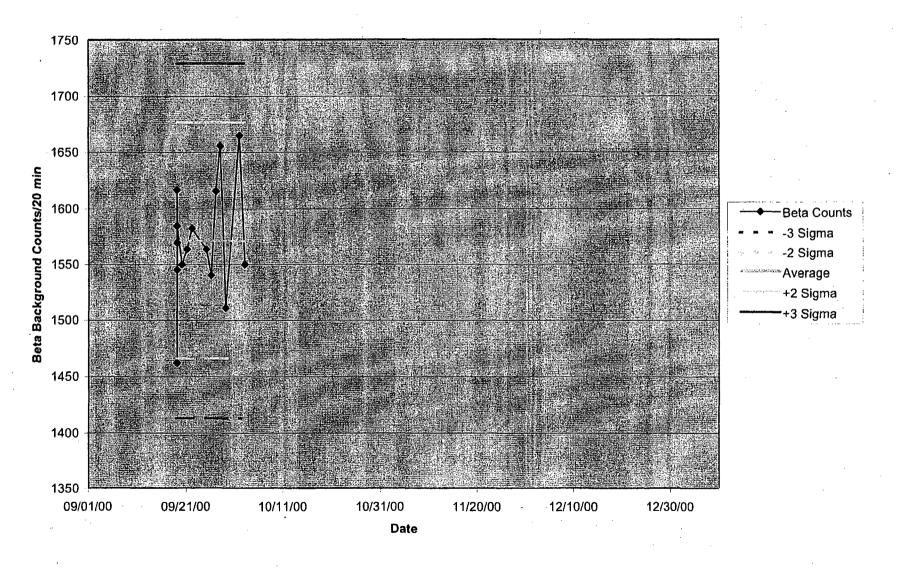
Beta Background Control Chart for Ludlum 2221 (SN163673)



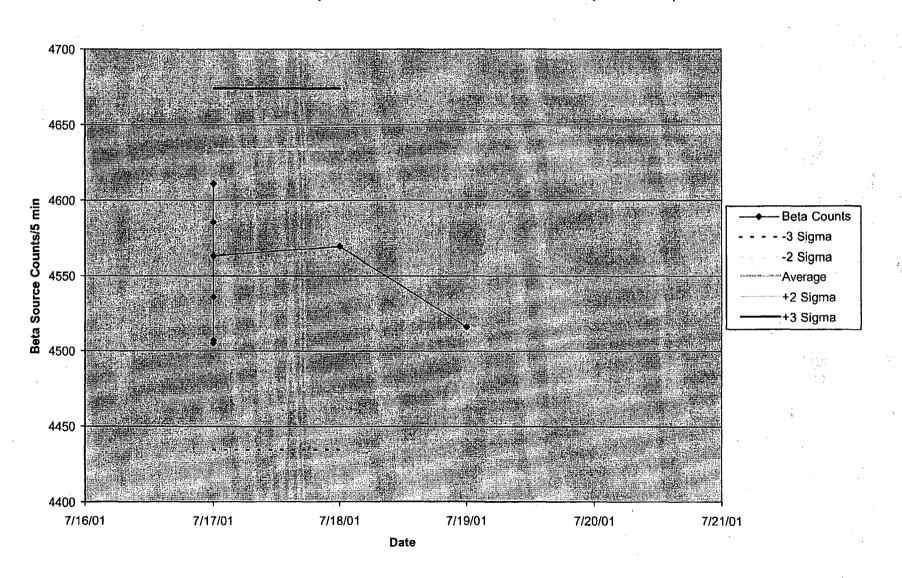
Beta Source Response Control Chart for Ludlum 2929



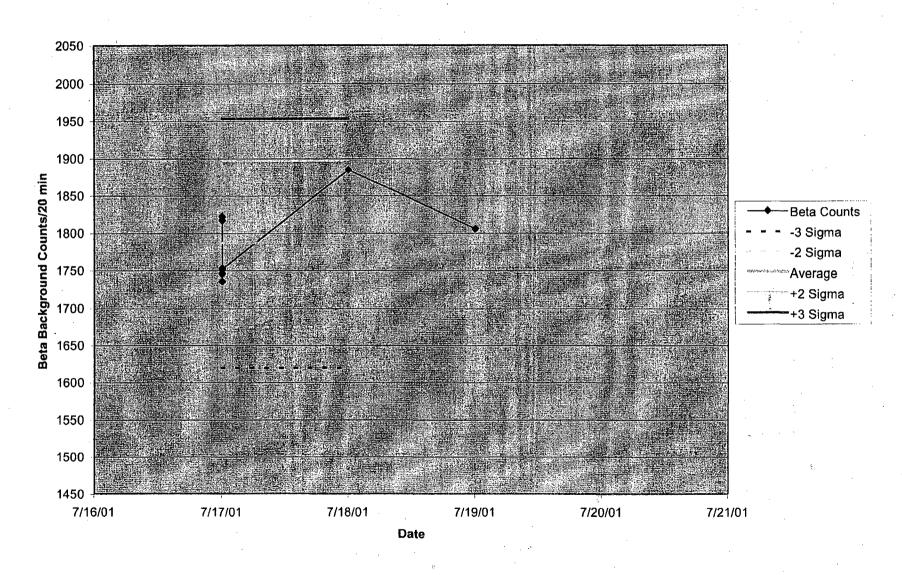
Beta Background Control Chart for Ludlum 2929



Beta Source Response Control Chart for Ludlum 2929 (SN 171590)



Beta Background Control Chart for Ludlum 2929 (SN 171590)



Appendix F:
Operating Procedures

1.0 PURPOSE

This procedure provides the methods Cabrera Services, Inc. (CABRERA) uses in operation of air samplers and calculation of radioactive particulate activity in air sample. This procedure describes the methods used to calculate Derived Air Concentration (DAC) DAC-hour exposures to workers. Adherence to this procedure will provide reasonable assurance that the surveys performed have accurate and reproducible results.

2.0 APPLICABILITY

This procedure will be used by CABRERA personnel to operate air samplers during surveys and work activities at the St. Albans VAECC facilities, calculate, and record DAC-Hour exposures to workers. Air samples are performed when the average beta contamination on facility surfaces, equipment and waste packages exceed the contamination limits specified in Table 1 of the Radiation Protection Program (RPP) and included as Appendix A of the HASP. Air monitoring shall be performed in areas where there exists potential to exceed 10 percent of any DAC.

₹ 3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

Not Applicable

3.2 Limitations

Not Applicable

- 3.3 Requirements
 - 3.3.1 Air samplers should only be operated in temperatures between -4⁰ F to 122⁰ F.
 - 3.3.2 Air sampler inspections shall be performed by qualified Health Physics personnel.

4.0 REFERENCES

HASP Safety and Health Program (Radiation Safety Program)
 OP-001 Radiological Surveys
 OP-021 Alpha-Beta Sample Counting Instrumentation

Reg Guide 8.25 Air sampling in the Workplace

• NUREG-1556 Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.
- 5.2 Smear Sample Survey A survey technique using filter paper smears to determine quantities of alpha and beta emitting radioactive material which can be removed from facility surfaces and waste packages.
- 5.3 Air Sample Survey A survey technique which collects particulates from a known volume of air and determines the concentrations of radioactive materials associated with the airborne particulates.
- 5.4 Annual Limit on Intake (ALI) The annual limit on intake (ALI) of radioactive materials is the smaller amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year (40 hours per week for 50 weeks) that would result in a committed effective dose equivalent (CEDE) of 5 rem or a committed dose equivalent (CDE) of 50 rems to any individual organ or tissue.
- 5.5 Derived Air Concentration (DAC) Derived air concentration is the concentration of a given radionuclide in air which, if breathed by "reference man" for a working year (40 hours per week for 50 weeks) under the conditions of light work (inhalation rate of 1.2 cubic meters of air per hour), results in an air intake of one ALI.
- 5.6 DAC-Hour The product of the concentration of radioactive material in air (expressed as a multiple of the derived air concentration for each nuclide) and the time of exposure to that nuclide, in hours, 2000 DAC-Hours represents one ALI.
- 5.7 Airborne Radioactivity Area A room, enclosure or area in which the radioactive material is dispersed in the form of dusts, tumes, mists, particulates, vapors and the concentration of the dispersed radioactive materials in excess of:
 - 5.7.1 The derived air concentrations (DAC's) specified in Table 1, column 3 of Appendix B, Title 10 Part 20 of the Code of Federal Regulations, or
 - 5.7.2 Concentrations such that an individual present in the area without respiratory protective equipment could exceed, during the hours the individual is present in a week, an intake of 0.6 percent on the annual limit on intake (ALI) or 12 DAC-hrs.

- 5.8 Effluent Monitoring A process, by which discharge of effluents to the environment of isotopes listed in, CFR Title 10 Part 20 Appendix B Table 2 column 1, is measured.
 - 5.8.1 The limit for Sr-90 is 6E-12 uCi/cc
 - 5.8.2 Monitoring of effluent discharge must be continuous during operation of the system

6.0 EQUIPMENT

6.1 Air sampling equipment will be selected for the type of analysis specified in the HASP. All samplers will be properly calibrated and the calibrations current.

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of air sampling and air sampling analysis are familiar with this procedure, adequately trained with the specific instrument being used to perform surveys.
- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for monitoring compliance with this procedure and training personnel in the use of the air sampling and air sampling analysis. The RSO can also assist in the interpretation of the results obtained during surveys.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT performing air sampling and air sampling analysis are responsible for knowing and complying with this procedure.

8.0 INSTRUCTIONS

- 8.1 Initial Preparation
 - 8.1.1 Select the air sampler to be used for the type of sample to be used and verify that the instrument has a currently valid calibration. If the work area contains radioiodine or tritium, contact the radiation safety officer for special sampling procedures before proceeding.

- 8.1.1.1 Area air samples are normally collected with a low volume air sampler having normal airflow of 1 CFM to 5 CFM.
- 8.1.1.2 Breathing zone air samples are normally collected using lapel air samplers, which have a normal airflow of 1 to 5 liters per minute.
- 8.1.1.3 Effluent samples are normally collected using in-line isokinetic sampling systems that match duct airflow speed with sample line speed.
- 8.1.1.4 All air sampling devices shall be calibrated to ensure accurate sample volumes are collected. The frequency of calibration shall not exceed one (1) year.
- 8.1.2 Attach the air sampling head to the intake of the low volume sample pump, to the tygon tubing of the Lapel sampler, or to the sampling system of the effluent discharge system.
- 8.1.3 Obtain the filter paper to be used in the sample and mark the backside of the filter with a unique number, which will represent the sample. During the collection and handling of air sample filter papers, caution must be used to prevent the samples from being contaminated by other radioactive materials.
- 8.1.4 Place the filter paper in the holder and position the sampler as indicated below.
 - 8.1.4.1 Area air samples are collected by placing the sample head at a distance of 3 to 6 feet above the floor and as close to the work area as practical. If there is airflow in the work area, the sampler should be placed "down wind" of the area where workers will be resuspending radioactive particulates into the workers atmosphere.
 - 8.1.4.2 Lapel air samples are collected from workers breathing zone. The sample head is attached to the shoulder of the worker with the sample head facing forward. The tygon tubing connecting the sample head to the pump is run down the back of the worker with the sample pump attached to the workers belt.
 - 8.1.4.3 Inline air samples are collected from exhaust system/vent systems. The sample head is placed between the sample probe and the sample pump in a smooth path without obstruction. Airflow should be matched to the flow in the system being sampled.

8.2 Collecting the sample

- 8.2.1 When the sample head is in position, start the sample pump and adjust the flow rate to the highest flow rate, which can be maintained without flow rate fluctuations or, in the case of effluent sampling, adjust to that specified by special instructions.
- 8.2.2 Record the time the sample was started and the initial flow rate of the sample pump on Form OP-002-01, Air Sample Data Sheet.

 Record the following effluent sampling data: System description, Flow rate in LPM, Time and date start on Form OP-002-04
- 8.2.3 If possible, identify the radionuclides, which will be encountered in the work area and record the radionuclides along with the DAC for each radionuclide in the space provided on the Air Sample Data sheet. If a mixture of radionuclides is present, the DAC used in the calculations of DAC-Hours will be the most restrictive concentration.
- 8.2.4 Collect the sample for the maximum time possible, which represents the exposure encountered by the worker.
- 8.2.5 At the end of the collection period, note the flow rate of the sample pump and record this flow rate and the time, which the sampling stopped on the Air Sample Data sheet.
- 8.2.6 Effluent sampling must be in progress any time the system is operating. Any time a sampler is found to be non-operational during system operation contact the RSO or duly authorized representative. Record the time the sample system was stopped and calculate the total volume of air sampled on the Air Sample Data Sheet.

CAUTION: Be sure not to remove activity from the sample surface. Handle the filter with care.

- 8.2.7 Remove the sample filter and place the filter in an individual envelope or poly bag to ensure no possibility of contamination by other sources of radioactivity.
- 8.2.8 Record the names of workers who were in the area and the time spent in the work area on the Air Sample Data sheet.
- 8.2.9 Determine the average sample flow rate by adding the initial sample flow rate and the final sample flow rate and dividing by 2. Record the average flow sample flow rate in the space provided on the Air Sample Data sheet.

- 8.2.10 Calculate the total air volume sampled by multiplying the average flow rate in cubic centimeters per minute by the total minutes the sampler operated using the indicated spaces on the Air Sample Data sheet.
- B.3 Determining minimum detectable activity (MDA) During calculations or air concentrations in the following sections, the MDA for each analysis is calculated to determine the statistical significance of the calculated air concentrations.
 - 8.3.1 For each air concentration calculation (alpha and beta) in the following sections, calculate the MDA using the following formula:

MDA in
$$\mu Ci/cm^3 = \frac{\frac{k_a^2}{T_{s+b}} + 2\left[k_a\right]\sqrt{\frac{R_b}{T_b} + \frac{R_b}{T_{s+b}}}}{(2.22 \times 10^6)(E)(V)}$$

Where:

E = Counter efficiency in CPM/DPM

R_b = Background Count Rate in CPM

T_b = Background Counting Time in Minutes

T_{s+b} = Sample Counting Time in Minutes

V = Sample Volume in cm³

2.22X10⁶ = Disintergrations per minute per microCurie (DPM/uCi)

 $k_{\alpha} = 1.645$ for a confidence level of 95% and 1.96 for a confidence level of 99%

- 8.3.2 If the MDA is larger than 10% of the Derived Air Concentration, recount the background for a longer time and/or increase the sample count time to lower the MDA. (The maximum count time should not exceed 1 hour for background and 30 minutes for the sample). Enter the MDA for each air concentration calculated in the space provided on the Air Sample Data sheet.
- 8.3.3 When calculating MDA for Effluent air analyses use a minimum of four (4) hours. MDA must be less than the limit listed in 10 CFR 20 Appendix B Table 2 Column 1 (insoluble). If this value (6E-12 for Sr-

- 90) is exceeded contact the RSO or duly appointed representative.
- 8.4 Initial Air Sample Analysis The initial analysis of air sample provides the air concentrations for short-lived radionuclides and a first estimate of the long-lived air concentrations. In situations where there is a potential for worker intakes to exceed 40 DAC-Hours in a week or if the radionuclides of interest are short-lived, air samples should be available before work resumes the following day.
 - 8.4.1 Air particulate samples are to be analyzed as a minimum for gross alpha and gross beta activity using a Ludlum Model 2929 Dual Channel Scaler or equivalent.
 - 8.4.2 Place the air sample collection media in the sample counter with the upstream collection side toward the detector. Count the air sample and calculate the sample activity and record results on appropriate form(s).
 - 8.4.3 Record the alpha and beta sample DPM results in the Air Sample Data sheet.
 - 8.4.4 Calculate the alpha and beta air concentrations using the following formula. Adjustment due to alpha self absorption are made as appropriate.

Air Concentration
$$(\mu Ci/cc) = \frac{\alpha \text{ or } \beta \text{ DPM}}{(2.22 \times 10^6 \text{ DPM} / \mu Ci)(SampleVolume(cm}^3))}$$

- 8.4.5 Enter the alpha and beta air concentrations on the Air Sample Data sheet in the space provided for the initial air concentrations.
- NOTE: If the air sample concentration is greater than 10% of the DAC value, notify the RSO or duly authorized representative for further instructions.
 - 8.4.6 If the air concentration is less than 10 percent of the most restrictive DAC, no further analysis of the air sample is required. If the air concentration exceeds 10% of the DAC concentration, proceed with the analysis in section 8.5.
 - 8.5 Air sample analysis for long-lived radionuclides This analysis allows for decay of naturally occurring radionuclides and provides for correcting air concentrations for naturally occurring radionuclides.
 - 8.5.1 Air particulate samples are analyzed following 12 hour decay, and again at 72 hours if necessary to allow for decay of radon, for gross

- alpha and gross beta using a Ludlum Model 2929 Dual Channel Scaler or equivalent.
- 8.5.2 Place the air sample in the sample counter with the collection side toward the detector. Count the air sample and calculate the sample activity and record results on appropriate form(s).
- 8.5.3 Record the alpha and beta sample DPM results in the Air Sample Data sheet.
- 8.5.4 Calculate the alpha and beta air concentrations using the following formula. Adjustments due to self absorption are made as appropriate.

Air Concentration
$$(\mu Ci/cc) = \frac{\alpha \text{ or } \beta \text{ DPM}}{(2.22 \times 10^6 \text{ DPM} / \mu Ci)(Sample Volume(cm}^3))}$$

- 8.5.5 Enter the alpha and beta air concentrations on the Air Sample Data sheet in the space provided for the 12-hour decay concentrations. If the 12-hour decay air concentrations is below 10% of the DAC no further analysis is required.
- 8.5.6 If the 12-hour air concentration is above 10% percent of the DAC value, recount the air sample following 72 hours of decay from the time the sample was stopped. Calculate the air concentration using the formula in step 8.5.4 and record the air concentrations in the space provided for the 72-hour decay air concentration on the Air Sample Data sheet. If the 72-hour air concentration is below 10% of the DAC value, no further analysis is required.
- 8.5.7 If the air concentrations exceed 10% of the DAC values, notify the RSO or duly authorized representative for further instructions. Save the air sample for possible further analysis. For air samples, which exceed 10% of the DAC values, an exposure is assigned to the workers residing in the area where the sample was taken.

- 8.6 Assignment of DAC-Hour exposures to workers
 - 8.6.1 For air samples which exceed 10% of the DAC values, calculate the workers DAC-Hour exposure using the following formula:

Exposure in DAC-Hours =
$$\frac{A \times B}{C}$$

Where:

A = Area or Lapel air sample concentration in uCi/cm³

B = Hours worker was in the calculated air concentration

C = DAC air concentration in uCi/cm^3 from regulatory reference.

- 8.6.2 Enter the DAC-Hour exposure on the column provided on the Air Sample Data sheet. If respiratory protection was used during the exposure period, contact the RSO or duly authorized representative for the protection factor used to adjust DAC-Hour exposure.
- 8.7 Effluent Air Discharge Calculation
 - 8.7.1 Calculate the discharge concentration using the following formula:

Air Concentration
$$(\mu Ci/cc) = \frac{DPM}{(2.22 \times 10^6 \ DPM/ \mu Ci)(Sample Volume(cm^3))}$$

Record the value on the Data sheet and inform the RSO or his duly authorized representative if the value exceeds, either the value listed in 10 CFR 20 Appendix B Table 2 Column 1. (This value is 6E-12 for Sr-90), Or greater than the MDA for the measurement.

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 The alpha and beta counter used to count air samples will be calibrated daily when in with a known radioactive source with activity traceable to the National Institute of Standards and Technology (NIST).
- 9.2 Records
 - 9.2.1 Documented information shall be legibly written in ink.

- 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.3 The health physics technician performing air sampling and analysis shall ensure that this procedure is the most current and approved revision.
- 9.2.4 The health physics technician performing air sampling and analysis shall review all applicable forms for accuracy and completeness.
- 9.2.5 Entries on and any other pertinent forms must be dated and initialed by the health physics technician performing the air sampling and analysis to be valid.
- 9.2.6 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-002-01	Air Sample Data Sheet
OP-002-02	Daily Air Sample Record
OP-002-03	Contamination Limits
OP-002-04	Effluent Air Sample Data Sheet

OP-002-01 Air Sample Data Sheet

DP-002	CA	BRERA SERVICE	ES. INC.	PAGE 1	1 OF 14
Performed By:		Date:			
·				· .	,
MDA =	μCi α/cm³	MDA =	μCi β/cm³		••
Alpha =			μCi β/cm³		
72 Hour Decay Concentration					
· · · · · · · · · · · · · · · · · · ·					
MDA =			μCi β/cm³		
Alpha =		Beta ==	μCi β/cm³		
12 Hour Decay Air Concentra	ation:				
MDA =	μCi α/cm ³	MDA =	μCi β/cm³		
Alpha =		Beta =	µCiβ/cm³		
initial Air Concentration:					
Total sample volume:	cm³			·	• • •
Average sample flow rate:	Total sam	ple time:	hours	٠.	
Final sample flow rate:	Time san	pler off:			
initial sample flow rate:	Time san	npler on:	-		
	D/	AC value:			
- .	•				
		AC value:			
Description:					`
Sample #	_	Date			

OP-002-02 Daily Air Sample Record

Worker Name	Sample Date	Final Count Date	Time in	Time out	Total time (Hrs.)	Concentration (uCi/cm³)	DAC-Hour Exposure
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			1.				

OP-002-03

Contamination Limits from Table 1 of RPM

RADIONUGLIDE		LE SURFACE MINATION 100 CM ²
	REMOVABLE	FIXED + REMOVABLE
Transuranics, Ra-226, Ra-228, Th-230, Pa-231, Ac-227, I-125, I-129	20	100
Th-Natural, Th-232, Sr-90, Ra-223 Ra-224, U-232, I-126, I-131, I-133	200	1000
U-Natural, U-235, U-238, and associated Decay products	1000	5000
Beta-Gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	1000	5000

OP-002-04 **Effluent Air Sample Data Sheet**

Sample #	Date			
Description:				
Radionuclides:	Effluent Air Limit:			
	Effluent Air Limit:	•		
Sample flow rate:	Time sampler on:			
Sample flow rate:	Time sampler off:			
Total sample time:	hours	•		
Sample Flow Rate in Liters/mi	n X time in minutes = Total sample volume: _		Liters X 1000 =	cm ³
Air Concentration:		en let		,
•				
AimComponenterion (· Ci	$(cc) = \frac{DPM}{(200 - 10^6) PPM}$			
All Concentration (ACI)	$(2.22\times10^6 DPM/\mu Ci)(Sam)$	pleVolune(c	$\overline{m^3}))$	
		. ,	n 4	
		•		
Activity =	μCi β/cm³	•		

μCi β/cm³

Permits

1.0 PURPOSE

This procedure describes the circumstances when a Radiation Work Permit (RWP) is required on Cabrera Services Inc. (CABRERA) Projects and addresses the requirements for planning, developing, issuing, using, modifying and terminating RWP's. The RWP provides a complete document addressing existing radiological conditions, work scope, radiological limitations, specific protective requirements, ALARA considerations and instructions to radiation workers. Adherence to this procedure will provide reasonable assurance that personnel exposures will be below specified limits, personnel will remain free of contamination and radioactive material contamination will not be spread beyond the designated contamination area location.

2.0 APPLICABILITY

This procedure will be used at the discretion of the Health Physics Technician or Project Manager to initiate an RWP prior to jobs where CABRERA personnel enter areas where; contamination is present above the limits specified in the Radiation Safety Program (RSP), when radiation exposure rates classify the work area as a radiation area, when air concentrations could exceed 10% of the Derived Air Concentration (DAC). This procedure describes the radiological surveys required to generate an RWP and provides guidelines to specific protective measures required based upon the radiological conditions in the work area.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

- 3.1 Precautions
 - 3.1.1 No work shall be performed involving radioactive material without initiation of an RWP unless otherwise directed by the RSO or duly authorized representative.
- 3.2 Limitations

Not Applicable

- 3.3 Requirements
 - 3.3.1 All work activities performed under this procedure shall be in accordance with Specific Project Health and Safety Plan (HASP) and its RSP.

- 3.3.2 The RWP requirements may be upgraded by the RSO or duly authorized representative. RWP requirements may not be downgraded except as described in paragraph 8.3.
- 3.3.3 Whenever practical, airborne radioactivity shall be controlled by the use of engineering controls. Engineering controls include, but <u>are not</u> limited to, decontamination, HEPA vacuums, ventilation, and containment.
- 3.3.4 A control point shall be set up at the discretion of the RSO or duly authorized representative at the location of entrance/exit to a contaminated area. At this control point, anyone exiting the contaminated area shall frisk all materials, including hands and feet, and notify the HPT if activities are above the levels presented in Table I of the Radiation Safety Program.

4.0 REFERENCES

 HASP. 	Safety and Health Program (Radiation Safety Program)
 OP-001 	Radiological Surveys
 OP-002 	Air Sampling and Analysis
 OP-019 	Radiological Posting
• OP-020	Operation of Contamination Survey Meters
 OP-021 	Alpha-Beta Counting Instrumentation
 OP-022 	Operation of Ionization Chambers
 OP-023 	Operation of Micro-R Meters

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Airborne Radioactivity Area A room, enclosure or area in which radioactive material is dispersed in the air in the form of dusts, fumes, particulates, mists, vapors, or gases and the concentration of the dispersed radioactive material is in excess of:
 - 5.1.1 The derived air concentrations (DAC's) specified in Table 1, column 3 of Appendix B, Title 10 Part 20 of the Code of Federal Regulations.
 - 5.1.2 Concentrations such that an individual present in the area without respiratory protective equipment could exceed, during the hours the individual is present in a week, an intake of 0.6% of the annual limit on intake (ALI) or 12 DAC-hours.

- 5.2 Contaminated Area –A restricted area that has radioactive materials above the limits specified in the Final Decommissioning Plan in the form of dusts, particulates, and sorbed contaminants that could adhere to personnel clothing and skin while working in the area.
- 5.3 Radiation Area Any area accessible to personnel in which there exists ionizing radiation at dose rates such that an individual could receive a deep dose equivalent in excess of 5 millirems in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.
- 5.4 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.
- 5.5 Personnel Survey A survey with radiation detection instrumentation that measures the amount of radioactive materials on personnel clothing or skin surfaces.
- 5.6 Lens Dose Equivalent (LDE) Exposure to the lens of the eye taken as the dose equivalent at a tissue depth of 0.3 centimeters.
- 5.7 Shallow Dose Equivalent (SDE) External exposure of the skin or extremity taken at a tissue depth of 0.007 cm and averaged over an area of 1 cm².
- 5.8 Total Effective Dose Equivalent (TEDE) TEDE is the sum of the deep dose equivalent (external dose) and the committed effective dose equivalent (internal dose).
- 5.9 Total Organ Dose Equivalent (TODE) TODE is the sum of the external component (deep dose equivalent) and the internal component (committed dose equivalent to an organ or tissue).

6.0 EQUIPMENT

None Required

7.0 RESPONSIBILITES

7.1 Project Manager (PM) - The PM is responsible for ensuring that all necessary personnel are familiar with this procedure, adequately trained in the used of the procedure, and have access to a copy of this procedure.

Permits

- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for monitoring compliance with this procedure and training of personnel working with this procedure. The RSO ensures the HPT are qualified by training and experience to perform the requirements of this procedure. The RSO is responsible for issue, control, and termination of RWP's.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT are responsible for performing the necessary surveys in support of RWP's, and job coverage of RWP's. The HPT has the responsibility to stop work if any unsafe condition exists in the work area, non-compliance with procedural requirements occurs, or significant changes in radiological conditions occur.
- 7.5 Radiation Workers Radiation Workers are responsible to read, understand, sign, and comply with the provisions of the RWP.

8.0 INSTRUCTIONS

- 8.1 Conditions Requiring an RWP
 - 8.1.1 Work involving radioactive material shall require a RWP unless otherwise directed by the RSO or duly authorized representative.
 - 8.1.2 Listed below are examples of jobs that require a RWP. If there is any question whether a job requires a RWP, the final determination will be made by the RSO or duly authorized representative.
 - 8.1.2.1 Work on or with material having total fixed activity in excess of 1000 dpm/100 cm² β , γ and/or 100 dpm/100 cm² α .
 - 8.1.2.2 Work on or with material having loose surface activity in excess of 20 dpm/100 cm² α and/or 200 dpm/100 cm² β , γ to 1000 dpm/100cm² β , γ depending on the nuclide(s) present.
 - 8.1.2.3 Filter changeouts of contaminated or potentially contaminated systems (i.e., Pre-filter, HEPA filters).

- 8.1.2.4 Work on any contaminated or potentially contaminated ventilation system where the integrity of the system may be breached or the interior accessed.
- 8.1.2.5 When air operated tools are to be used in a manner that is likely to generate airborne contamination.
- 8.1.2.6 Any job requiring welding, grinding or burning on contaminated material or equipment.
- 8.1.2.7 Work in a posted Airborne Radioactivity Area.
- 8.1.2.8 Work in a posted Radiation Area.
- 8.1.2.9 Work in a posted Contaminated Area.
- 8.1.3 Direct surveillance by qualified RSO or duly authorized representative may be used in lieu of a RWP in an emergency situation. The RSO or duly authorized representative have the authority to direct all matters associated with radiation protection and shall specify the radiological requirements to control personnel exposure to radiation.

8.2 RWP Initiation

- 8.2.1 RWPs are initiated by the cognizant individual responsible for the task. The initiator shall complete the location of work, detailed description of work, and job supervisor on Attachment 1. A RWP addition sheet (AP-012-02) shall be used as needed and attached to the RWP.
- 8.2.2 Work to be performed shall be clearly described.
- 8.2.3 The RSO or duly authorized representative shall approve the RWP. The RWP will not be approved unless the detailed description of work can be clearly understood.
- 8.2.4 The RSO or duly authorized representative may request that a detailed procedure be prepared if, in his/her opinion, the description of the work to be performed is unclear or the safety risks are considered to be high.
- 8.2.5 RWP numbers consist of the project name and a year prefix followed by the next available sequential number. Record the RWP number

- in the RWP Log sheet (AP- 012- 03) with a brief description of the description of work and on AP-012- 01 in the RWP "No." box.
- 8.2.6 The RSO or duly authorized representative shall complete the summary of radiological conditions and required radiological control sections of AP-012-01. Historical and/or pre-job surveys should be used for the radiological condition section.
- 8.2.7 The RSO or duly authorized representative shall review and approve the RWP prior to implementation.
- 8.2.8 An RWP may remain in effect for the duration of the job. However, RWPs authorizing work for periods anticipated to be greater than one month should be reviewed and re-authorized on a monthly basis.

RWP Implementation

- 8.3.1 Individuals authorized to work on the RWP shall print and sign their name on the original copy of the RWP, indicating that they have read and understand the RWP requirements. The RSO or duly authorized representative is responsible for ensuring the proper implementation of the RWP.
- 8.3.2 A copy of the RWP should be kept at the job site.
- 8.3.3 Individuals may be added to a non-terminated RWP by the HPT and are required to sign both the original and working copy.
- 8.3.4 Changes made to a non-terminated RWP shall be authorized by the by the RSO or duly authorized representative. The changes shall be made to both the original and the job site copy.
 - 8.3.4.1 Initial and date any changes made.
- 8.3.5 If the scope of worker conditions (scope of work or radiological conditions) are significantly different than those expected when the RWP was generated, the RWP shall be terminated and a new one issued.

8.4 RWP Termination

8.4.1 A RWP may be terminated by the RSO or duly authorized representative for any of the following reasons:

Permits

- 8.4.1.1 Work is complete
- 8.4.1.2 Work scope or radiological conditions significantly different from the RWP.
- 8.4.1.3 At the discretion of the RSO or duly authorized representative.
- 8.4.2 The terminated RWP package shall consist of the following:
 - Pre-job survey(s) and/or historical information
 - Post-job survey (if applicable)
 - All copies of the RWP
 - Copies of air sample results from individuals working under the RWP (if applicable).
- 8.4.3 The RWP package shall be reviewed and terminated by the RSO or duly authorized representative.

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 Individual(s) working under a RWP shall be trained in the requirements of this procedure.
 - 9.1.2 Individual(s) working under a RWP shall ensure that this procedure and associated attachments are the most current revision.
 - 9.1.3 Information documented on any of the attachments shall be legibly written in ink. Drawing a line through the error and initialing the change shall make any corrections.
 - 9.1.4 The terminated RWP package shall be kept by the RSO or duly authorized representative for future review.
- 9.2 Records
 - 9.2.1 Records of work performed under a RWP and records directly related to the RWP shall be kept by the RSO or duly authorized representative.

9.2.2 The original copy of the RWP shall be kept by the RSO or duly authorized representative.

10.0 ATTACHMENTS

•	AP-012-01	Radiation Work Permit
•	AP-012-02	Additional RWP Sign-In Sheet
•	AP-012-03	Radiation Work Permit Log

ST.	ALBANS PROJECT	AP-012-01 FRADIATION WORK I	PERMIT
Job Supervisor	Date		No.
ocation of Work :			
Description of Work:			
		ADIOLOGICAL CONDITION	
Location	Contamination Leve	els Radiation Levels	Airborne Concentration
	REQUIRED RA	DIOLOGICAL CONTROLS	
Coveralis Hood Surgeons Surgeons	Cap	Glove Liners Plastic Shoe Covers Rubber Shoe Cover Tape Gloves to Slee	Pre-Job Meeting Continuous HP
Rubber Gl Trained Ra PECIAL INSTRUCTIONS	oves adiation Worker(s)	Plastic Suit	Coverage TLD
SIGNATURE INDICATES T	HAT YOU HAVE READ	AND UNDERSTAND THE R	ADIOLOGICAL CONDITIONS A
		CONTROLS	
Name	Signature	Name	Signature
		l ·	
DDDOVED DV	· · · · · · · · · · · · · · · · · · ·		DATE:
PPROVED BY:	•		DATE:
EAPPROVED BY:			DATE:
WP TERMINATED BY:			DATE:
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Reviewed By:

AP-012-02 ST. ALBANS PROJECT RADIATION WORK PERMIT ADDITION SHEET - RWP #							
NAME	SIGNATURE	NAME	SIGNATURE				
			<u> </u>				
e en general	No. of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second secon						
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20.							

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Date: _

AP-012-03

RWP #	RADIATION WORK PERM General Description	Date Issued	Date Terminated
17:			TOTTO
partie 1			
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		,	·
			· · · · · · · · · · · · · · · · · · ·
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Reviewed by:		Date:
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Revision 0 9/8/2000

1.0 PURPOSE

This procedure provides instructions for monitoring personnel for exposure to radiation in the workplace. Adherence to this procedure will provide reasonable assurance that exposures to radiation will be properly monitored enabling exposure to be controlled to As Low As Reasonably Achievable (ALARA).

2.0 APPLICABILITY

External radiation monitoring shall be conducted when it is likely that an adult will exceed 10% of the annual limits listed in 10 CFR 1201(a) or at a more conservative limit chosen by the RSO or duly authorized representative.

This procedure will be used for monitoring of all personnel for exposure to radiation. Monitoring will be provided as described in the site specific work plan for the job to be accomplished.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

Not Applicable

3.2 Limitations

Not Applicable

- 3.3 Requirements
 - 3.3.1 Site Registration Form
 - 3.3.1.1 All new personnel and visitors required to enter a RCA must complete a Site Registration Form (AP-008-01) prior to starting work at a facility.
 - 3.3.1.2 Completed Site Registration Form will be retained with the individual personnel exposure file. Site Registration Forms for CABRERA personnel will be updated annually or earlier if existing information is known to be incorrect.
 - 3.3.2 Occupational Radiation Exposure History
 - 3.3.2.1 An NRC Form 4 or equivalent must be completed by each individual and reviewed by the RSO or duly authorized representative prior to the individual being permitted to work

in a radiological controlled area (RCA) where a dose of more than 25 mrem could be received.

3.3.3 Dosimetry Assignment

- 3.3.3.1 The Thermoluminescent Dosimeter (TLD) badge number. name, social security number, whether or not a worker has a completed NRC Form 4 or equivalent, the monitoring period (date from...to) and the individuals date of birth shall be recorded on OP-008-01, for each individual monitored on a project. The original form will be maintained as a permanent record of the project monitoring. A copy will be maintained in the CABRERA, East Hartford office.
- 3.3.4 Occupational Exposure Limits & Administrative Control Levels.
 - 3.3.4.1 Nuclear Regulatory Commission limits per calendar year:

Whole Body (TEDE)	5 Rem
 Lens Dose Equivalent (LDE) 	15 Rem
 Shallow Dose Equivalent (SDE) (Skin or Extremity) 	50 Rem
Organ Dose (CDE)	50 Rem
3.3.4.2 Administrative Control Levels (per quarter)	
 Whole Body (TEDE) 	1.25 Rem
 Lens Dose Equivalent (LDE) 	3.75 Rem
 Shallow Dose Equivalent (SDE) (Skin or Extremity) 	12.5 Rem
Organ Dose (CDE)	12.5 Rem

3.3.4.3 Only the CABRERA RSO or duly authorized representative shall authorize exposure above the Quarterly Administrative Control Levels.

3.3.5 Radiological Control Areas

3.3.5.1 An RCA is considered to be any portion of a facility, plant, vehicle or project for which restrictions apply for purposes of occupational radiation exposure control. Radiation

- exposures received within the boundary of a restricted area are occupational exposures. As described in the applicable Project Detail Work Procedure, RCAs will be established to provide the specific radiological controls necessary for the completion of the work scope and the protection of all project personnel. The following guidelines apply:
- 3.3.5.2 An RCA is always located within a restricted area as defined by 10 CFR 20. Each radiation area, high radiation area, airborne radioactivity area and contaminated area shall be contained within an RCA.
- 3.3.5.3 Personnel and casual visitors within an RCA will be provided with appropriate dosimetry and monitored for radiation exposure when appropriate.
- 3.3.6 Radiation Work Permits
 - 3.3.6.1 Personnel working in an RCA must be assigned to a specific RWP applicable to the job being performed.
 - 3.3.6.2 Direct Reading Dosimeters will not be required at the St. Albans VAECC.
- 3.3.7 Occupational Radiation Exposure History Request
 - 3.3.7.1 An Occupational Radiation Exposure Request, AP-008-05 will be completed for all personnel for whom permanent exposure results have been obtained. Copies of this letter will be sent to the individual, and maintained in the individual's personnel exposure file by the CABRERA Radiation Safety Office, East Hartford.
 - 3.3.7.2 Any time CABRERA is required to report an individual's exposure to the Nuclear Regulatory Commission or other regulatory agency, a copy of the report will be sent to the individual.
- 3.3.8 Project Records / Documentation
 - 3.3.8.1 Upon completion of the project, it will be the responsibility of the RFS or designee to forward all project records, logs, and communications regarding personnel exposure, exposure records, dosimetry records, and all other pertinent information about personnel dosimetry and individual radiation protection for RSO or duly authorized

representative review, and filing in anticipation of NRC review.

4.0 REFERENCES

•	HASP	Safety and Health	Program (Rad	liation Safety	Program)
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- AP-012 Radiation Work Permits
- OP-001 Radiation and Contamination Surveys
- AP-009 Training Program

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Monitoring Measurement of radiation exposure to evaluate potential dose equivalent to the individual.
- 5.2 Dosimetry Devices worn on the body (TLD) to measure the radiation dose received by the exposed individual.
- 5.3 Dose The deposition of energy in matter. Equivalent to the radiation dose times the quality factor for the type of radiation.
- 5.4 Quality Factor The factor, which is radiation dependent and identifies the relative biological effectiveness of a radiation type and energy. The quality factor is multiplied times the Dose to yield the Dose Equivalent.
- 5.5 TEDE The Total Effective Dose Equivalent The sum of the Deep Dose Equivalent (external dose) and the Committed Effective Dose Equivalent (internal dose).
- 5.6 CDE Committed Dose Equivalent The dose equivalent to organs or tissues that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.
- 5.7 CEDE Committed Effective Dose Equivalent The sum of the products of all organs or tissues with CDE and their respective weighting factors.
- 5.8 SDE Shallow Dose Equivalent Applies to the skin and to any extremity, it is used for external radiation which cause primary energy deposition in the first 0.007 cm of tissue averaged over one square centimeter.
- 5.9 LDE- Eye Dose Equivalent The dose delivered to the lens of the eye at a tissue depth of 0.3 centimeters.

- 5.10 DDE Deep Dose Equivalent The dose equivalent delivered by external radiation to tissue at a depth of 1 centimeter.
- 5.11 TLD Thermoluminescent Dosimeter A device which provides passive measurement of DDE, SDE, and/or LDE.

6.0 EQUIPMENT

None

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) The PM is responsible for ensuring that personnel assigned the tasks using radioactive or hazardous materials are properly trained in their use and the necessity that they be monitored for exposure to radiations and hazardous materials as described in the site specific work plan.
- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of personal monitoring devices for radiation and hazardous materials.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT are responsible for performing the surveys described in the site specific work plan and ensuring the proper use of monitoring devices by workers.
- 7.5 Workers All personnel are required to wear their dosimerty as required by the RWP and to maintain their exposure to radiation ALARA.

8.0 INSTRUCTIONS

- 8.1 Radiation Dosimetry TLD
 - 8.1.1 At a minimum, TLD's provided by a NVLAP certified vendor for the exposure period, will be used to monitor all personnel who could potentially receive 10% or more of the permissible dose limit for external radiation exposure. Personnel working in RCA's, will wear a TLD. Other appropriate radiation exposure monitors will be assigned accordingly (e.g., extremity dosimetry) at the discretion of the RSO or duly authorized representative.

- 8.1.2 TLD's are the permanent record of an individual's occupational radiation exposure. Upon receipt of project dosimetry, TLD's and extremity dosimetry shall be stored in a low background area inside the project main office or in other designated storage locations when not in use. A (TLD) control badge shall be kept where the assigned badges are stored when they are not in use. All CABRERA personnel entering a RCA will be issued, at a minimum, a TLD.
- 8.1.3 The individual's name, social security number, issue date, and date of return will be recorded on form AP-008-03.
- 8.1.4 The TLD, which monitors DDE, SDE, and/or LDE, shall be worn on the front torso in the region of the torso, expected to receive the highest dose. In cases where other areas of the body may receive a higher dose, the HPT shall evaluate and formally require (by specification on the RWP) that the dosimetry be worn at that body location. Multibadging may be utilized in certain situations as deemed appropriate by the RSO/RFS.
- 8.1.5 Extremity monitoring shall be provided when necessary as described by the specific site work plan, or at the discretion of the RSO/RFS.

8.2 Visitors/Group Monitoring

- 8.2.1 A casual visitor is any person touring or visiting the RCA on an infrequent basis, escorted while in the restricted area and not performing or supervising hands on work.
- 8.2.2 Visitors will be issued a TLD on a case by case basis depending on the type and duration of the job. The RFS or RSO shall determine if a TLD is to be issued to a visitor. TLD's will always be issued to contractors expected to exceed 500 mrem. A visitor expected to receive in excess of 25 mrem shall be trained and provided dosimetry.

8.3 Visitor RCA Conditions

- 8.3.1 A visitor may be escorted into a RCA provided that:
 - 8.3.1.1 No entries into a high radiation areas, surface contamination areas, or airborne radioactivity areas shall be allowed,
 - 8.3.1.2 External radiation exposure is limited to 50 mrem per year, or 10 mrem per entry.
 - 8.3.1.3 The visitor is furnished with dosimetry, when appropriate.

- 8.4 Visitor Dosimetry
 - 8.4.1 Visitors within an RCA shall receive, as a minimum, a TLD
 - 8.4.2 Visitor TLD results are recorded on form AP-008-01, which is maintained at the facility. When a visitor is issued a TLD, the individual's, name, social security number, issue date, and date of return will also be recorded on form AP-008-03.
- 8.5 Lost, Damaged or Questionable Dosimetry
 - 8.5.1 In the event of a Lost, Damaged or Questionable TLD, the RFS or RSO shall be notified immediately. A Lost, Damaged or Questionable Dosimetry Report, (AP-008-02) will be completed and filed in the individual's exposure file. The dose estimated from all exposure received while the individual was in an exposure situation must be determined and recorded in the individual's dose record.
 - 8.5.2 In the event of multiple occurrences, the RSO or duly authorized representative shall be notified immediately.
 - 8.5.3
- 8.6 Project Dosimetry Issuance/Control
 - 8.6.1 Prior to project commencement, the RFS and/or the RSO will determine the appropriate radiation monitoring dosimetry required based upon the radionuclides and activity present at the work area. The RFS will contact the RSO to provide the following information:
 - CABRERA Project Name and Account Number
 - Project start date and project duration
 - Suggested dosimetry required for project, including radiation type to monitor for
 - Quantity of dosimeters requested on a quarterly basis including controls
 - Name, address, social security, birth date of project personnel to be monitored.
 - Address dosimetry is to be shipped to.

- 8.6.2 Personnel assigned to projects will wear the appropriate dosimetry for no more than one quarter or the duration of the project, whichever is shortest.
 - 8.6.2.1 It will be the responsibility of the RFS or RSO to return dosimetry to the vendor for processing at the end of each quarterly monitoring period.
 - 8.6.2.2 If the original projected project duration is extended, the RFS or designee shall inform the RSO so that the proper arrangements can be made to supply additional dosimetry from the vendor.
 - 8.6.2.3 The quarterly issue period may be extended at the discretion of the RSO or duly authorized representative. Extensions shall be "with cause" actions and documented by memo, at a minimum.
 - 8.6.2.4 Dosimetry shall be maintained on site in a low dose rate area with control(s), when not being worn by personnel.
- 8.6.3 Dosimetry Processor (Vendor)
 - 8.6.3.1 The dosimetry vendor must be NVLAP certified in accordance with the project Health and Safety Plan and 10 CFR 20.1501.
 - 8.6.3.2 Upon receiving project dosimetry, the RFS or designee shall verify that the dosimetry received meets the requirements of the project. Any problems should be reported to the CABRERA RSO or duly authorized representative for immediate attention and resolution. All documentation received with dosimetry will be filled out completely. When all required preliminary training documentation has been completed as described in the project Detail Work Procedure, dosimetry will be issued to project personnel.
- 8.7 It is the responsibility of the RFS or designee to ensure that AP-008-03 is completed at the time of dosimetry issuance and a copy is sent to the CABRERA East Hartford Office location.

9.0 QUALITY ASSURANC/RECORDS

9.1 Records

- 9.1.1 Documented information shall be legibly written in ink.
- 9.1.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.1.3 The health physics technician using this procedure shall ensure that it is the most current and approved revision.
- 9.1.4 The health physics technician shall review Forms AP-008-01 through AP-008-04 for accuracy and completeness.
- 9.1.5 Entries on Forms AP-008-01 through AP-008-04 and any other pertinent forms must be dated and initialed by the health physics technician performing the inventory to be valid.
- 9.1.6 The RSO or duly authorized representative shall review completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

•	AP-008-01	Site Registration Form
•	AP-008-02	Lost, Damaged or Questionable Dosimetry Report
•	AP-008-03	Radiation Dosimetry Issue Log
•	AP-008-04	Radiation Exposure Report
•	AP-008-05	Occupational Exposure History Request NRC Form 4

AP- 008-01 Site Registration Form

MINISTRATIVE INFORMATION		
Date:		
Date of Birth:		
	`	
		٧
	F1	
`		
Date:		
DOSIMETRY USE ONLY		
DRD Reading:	mrem	
TLD Badge Results	mrem	
TION SAFETY OFFICER APPROVAL		
liation work as specified in the CABRERA Radiation	on Safety Manual: Yes	No
tion work with consideration of the notes below:	Yes	No
	Date: Date of Birth: Date: DosiMetry use only DRD Reading: TLD Badge Results TION SAFETY OFFICER APPROVAL	Date: Date of Birth: Date: DOSIMETRY USE ONLY DRD Reading:mrem TLD Badge Resultsmrem TION SAFETY OFFICER APPROVAL Interval and the CABRERA Radiation Safety Manual: Yes

AP-008-02
Lost, Damaged or Questionable Dosimetry Report

	ADMINISTRATIVE					
Report Date/Time:						
Project Name/No.:						
Project Manager/Contact:						
Individual's Name/SSN:						
Badge No.:						
Date/Time of Incident:						
Location if known:						
Applicable RWP No.:			·.			
Date Badge was Issued:		· .				
DO	OSE CALCULATION					
Dose from dosimeter readings	(Total from date issued) thru	(Date) =	mrem			
2. Current dosimeter reading	(If more than one dosimeter, use h	nighest reading) =	·mrem			
3. If individual was not wearing a dosimeter, in the same area. If none, use dose rate x tir	or lost the dosimeter, assign higherne in area for the same period.	st exposure received b	y workers			
Dose Rate	(mrem/hour) x Time	(hours) =	mrem			
Total estimated exposure to be assigned:		=	mrem			
THE METHOD USED TO ESTIMATE MY EXPOSURE HAS BEEN EXPLAINED TO ME, AND THE ESTIMATE DOSE ASSIGNED TO MY RECORD IS ACCEPTABLE FOR THIS EVENT.						
Individual's Signature:	Individual's Signature: Date:					
DOSE RECORD AUTHORIZATION						
Dose Estimate Calculations By:		Date:				
Dose Estimate Reviewed By:(RSO)_		Date:				
Dose Estimate Posted By:		Date:				

AP-008-03 Radiation Dosimetry Issue Log

Project/l	ocation:		Badge Series No.:			
TLD#	Name	SSN	Form 4 (Y/N)	Dates (From/To)	DOB	
	ŕ					
·						
		·				
	·					
	Att Control					
				,		
			·			
				,		
Review	ed by:			Date:		

AP-008

CABRERA SERVICES, INC.

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AP-008-04 Radiation Exposure Record

Name:			-	SSN:	•			
Birth Date:			•					
TLD Badge	No.:	·						
Quarterly W	hole Boo	iy Dose: 1'	st	2 nd	3 rd	4 th _	 .	
Lifetime Wh	ole Body	Dose Equ	ivalent:	(Rem) Mo	nitoring Yea	ır:	• ·
Monitoring Period	Whole Body (DDE)	Shallow Dose (SDE)	Extremity Dose (SDE)	Lens Dose (LDE)	Organ Dose (CDE)	Internal Effective Dose (CEDE)	Total Effect Equivalent (DDE+CED TEDE/Cum	– Rem E)
January								
February							:	
March								
April						÷		
May								
June			·					
July								
August								
September			·					
October							:	
November							·	
December		-					:	
Yearly Totals								
Notes: N/M = Not Monitored								
Reviewed:					<u>.</u>	Date:		·
RSO:		· · · · · · · · · · · · · · · · · · ·	<u> </u>	·	-	Date:		
AP-008	:		CARRE	A SERVIC	ES INC	· · · · · · · · · · · · · · · · · · ·	Pan	e 13 of 14

AP-008-05 OCCUPATIONAL RADIATION EXPOSURE HISTORY

Name: S	SN:	
Addrage:		
	·	
Date of Birth:		· .
The above individual was monitored by:	TLD:	Direct Reading Dosimeter:
This is a:	Record:	Estimate:
Monitoring Device Number:		•
The monitoring period was: From:	To:	
The Occupational Radiation Exposure was red	ceived during:	
Assignment for:	License No.:	1
Address:		·
City/State/ZIP:		•
Telephone:		
RADIATION EXP	OSURE RESU	JLTS
Deep Dose Equivalent for the period stated at	Rem (DDE)	
Shallow Dose (skin) for the period stated above	Rem (SDE)	
Extremity Dose for the period stated above:	Rem (SDE)	
Eye Dose Equivalent for the period stated abo	ve:	Rem (LDE)
Committed Effective Dose Equivalent (Internal	I):	Rem (CEDE)
Total Effective Dose Equivalent (DDE + CEDE	<u> </u>	Rem (TEDE)
This report is furnished to you under the provisions CFR Part 20 titled "Standards for Protection Agains further reference.		
Radiation Safety Officer:		_Date:
<u> </u>	• •	
AP-008 CABRERA SE	ERVICES, INC.	Page 14 of 14

1.0 PURPOSE

This procedure provides the methods for operating beta/gamma survey meters when performing contamination surveys. Adherence to this procedure will provide reasonable assurance that the surveys performed have reproducible results.

2.0 APPLICABILTY

This procedure will be used by Cabrera Services, Inc. (CABRERA) personnel to measure fixed and removable beta-gamma emitting contamination on facility surfaces, equipment, waste packages, personnel, personnel protective clothing, etc.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

3.1 Precautions

- 3.1.1 Ensure that the thin Mylar or mica window on the probe face is protected from punctures during survey operations.
- 3.1.2 If any instrument inconsistencies are observed (e.g., unusually high or low background readings, source checks outside the acceptable range, etc.), remove the instrument from use, label it "OUT OF SERVICE" and report the condition to the Radiation Safety Officer (RSO) or duly authorized representative.

3.2 Limitations

Not Applicable

3.3 Requirements

- 3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).
- 3.3.2 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.
- 3.3.3 Survey instrument calibrations shall be performed by an NRC or Agreement State licensed calibration facility.

4.0 REFERENCES

HASP Safety and Health Program (Radiation Safety Program)

OP-001 Radiological Surveys

OP-009
 Use and Control of Radioactive Check Sources

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.
- 5.2 Contamination Survey A survey technique to determine fixed and removable contamination levels.
- 5.3 Acceptance Range A range of values that describe an acceptable daily instrument source check result.

6.0 EQUIPMENT

Applicable alpha, beta/gamma survey instrumentation chosen at the discretion of the RSO/RFS or duly authorized designee.

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of operating contamination survey meters are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of contamination survey meters described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT operating contamination survey meters are responsible for knowing and complying with this procedure.

8.0 OPERATION

- 8.1 Instrument Inspection
 - 8.1.1 Select the contamination survey meter and probe to be used in the survey.
 - 8.1.2 Before each use, perform the following checks:
 - 8.1.2.1 Verify the instrument has a current calibration label.
 - 8.1.2.2 Visually inspect the instrument for physical damage or defects.
 - 8.1.2.3 Position the meter switch to "BAT". Check to see that the needle falls within the "Bat Test" checkband.
 - If the needle falls below the "Bat Test" checkband, install new battery(s).
 - If the needle still falls outside the "Bat Test" checkband after the installation of new battery(s), tag the instrument "Out of Service" and notify the RSO or duly authorized representative.
 - 8.1.3 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.2.1 through 8.1.2.3 and notify the RSO or duly authorized representative.
- NOTE: Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or duly authorized representative be notified.
 - 8.2 Pre-operation of instrument
 - 8.2.1 Position the meter fast/slow ("F/S") switch to "S".
 - 8.2.2 Position the meter switch to the appropriate range scale.
 - 8.2.3 Obtain an OP-020-01 Form.
 - 8.2.4 If a Quality Control (Q.C.) acceptance range has not already been calculated on the OP-020-01 Form, then follow the instructions below, other wise proceed to step 8.2.6.
 - 8.2.5 Enter the QC check source, probe, and meter numbers on Form OP-020-01.

- 8.2.5.1 Ensure the source and detector are in a reproducible geometry, which will be used each time this check is performed.
- 8.2.5.2 Obtain ten separate measurements in a low background area.
- 8.2.5.3 Calculate the average of the ten measurements by adding the measurements and dividing the sum by ten.
- 8.2.5.4 Multiply the average measurement value established in 8.2.5.3 by 0.8 and record on Form OP-020-01 as the lower QC acceptance range.
- 8.2.5.5 Multiply the average measurement value established in 8.2.5.3 by 1.2 and record on Form OP-020-01 as the upper QC acceptance range.
- 8.2.6 Place the QC check source and detector in the proper geometry established for QC check.
- 8.2.7 Allow the instrument reading to stabilize (approximately 30 seconds). Compare the reading to the response check criteria on Form OP-020-01. If the response reading falls outside of the acceptance range, note Fail on Form OP-020-01, tag the instrument "Out of Service" and notify the RSO or duly authorized representative. If the reading falls inside the acceptance range, note Pass on Form OP-020-01; the instrument is ready for performing surveys.
- 8.3 Contamination Survey Techniques

Caution:

The window area of beta detector windows is 1.7 mg/cm² mica. The window can be easily damaged while surveying areas having protruding fragments. Remove these fragments, if possible, before performing surveys.

Note:

To maintain the calibrated detection efficiency, the detector must be held at the appropriate height, determined during calibration, when surveying. For example, if a beta probe's efficiency was calculated at 1/2 inch from the calibration source, the detector must be held at 1/2 inch from the surface being surveyed to maintain calibrated detection efficiency.

Note:

Avoid contacting the detector probe to the area being surveyed. This potentially could contaminate the probe.

8.3.1 Verify the instrument selector switch is in the X 0.1 position.

- 8.3.2 For a stationary reading, place the detector over the area to be measured and allow meter to stabilize. Record the average meter indication in CPM β/PA on applicable forms.
- 8.3.3 For a scan survey move the detector slowly over the surface (less than one detector width per second). Observe meter indication. If increased readings are observed return to the area and obtain a stationary reading. Record maximum area meter indication in CPM β/PA, on applicable forms.

8.4 Interpretation of Results

The meter reading on the alpha and beta/gamma survey meters must be corrected for detector efficiency and detector surface area before comparing results with the contamination units in Section 3.6 of the Radiation Safety Program. The conversion from CPM α /PA or CPM β /PA to DPM α /100 cm² or β /100 cm² is performed using the following equation.

$$(DPM / 100 cm^2) = \frac{(AxB)}{C}$$

Where:

- A = Alpha or Beta/Gamma survey meter indication in net CPM α /PA or β /PA (i.e. Gross Alpha or Beta Survey Counts minus background counts = Net CPM/PA)
- B = 100 cm² divided by the effective detector surface area in cm². With an effective surface area of 50 cm² for the Ludlum 43-5 alpha detector, the value of B is approximately 2 or for the 15 cm² for the Ludlum 44-9 beta detector, the value of B is approximately 6.7.
- C = Detector efficiency (expressed as decimal).

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 The health physics technician performing the survey shall ensure that this procedure is the most current and approved revision.
- 9.2 Records
 - 9.2.1 Documented information shall be legibly written in ink.
 - 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single

line across the entry. The correction shall be entered, initialed, and dated.

- 9.2.3 The HPT performing the survey shall review Form OP-020-01 and any other applicable forms for accuracy and completeness.
- 9.2.4 Entries on Form OP-020-01 and any other pertinent forms must be dated and initialed by the HPT performing the survey to be valid.
- 9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-020-01 Survey Meter Source Check Form

OP-020-01 - Survey Meter Source Check Form

Probe:	· · · · · · · · · · · · · · · · · · ·	Serial No.:						
Meter:	er:Serial No.:			Cal. Due_	Cal. Due			
Source:		QC Acceptance Range: Lower			Pr			
Date	Read	ing	Pass/ Fail	:	H.P. Tec	hnician	H.P. Tech Initials	
			 					
			 					
						<u></u>		
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Reviewed E	Зу:				Date:	······································	_	
OP-020-01		Cabrer	a Service	s, Inc.			Page 7 of 7	

1.0 PURPOSE

This procedure provides instruction on the operation and setup of an alpha/beta sample counter. Adherence to this procedure will provide reasonable assurance that the surveys performed have reproducible results.

2.0 APPLICABILITY

This procedure will be used by Cabrera Services, Inc., (CABRERA) personnel operating an alpha/beta sample counter during surveys. Types of surveys that may use an alpha/beta sample counter are:

- Smear surveys performed to determine the removal of alpha and/or beta contamination on facility surfaces, equipment, waste, and source packages, etc.
- Air sample surveys performed in a workers breathing zone and effluent discharge to determine alpha and/or beta air concentrations.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

3.1 Precautions

- 3.1.1 If any instrument inconsistencies are observed (e.g., unusually high or low background counts, source checks outside the tolerance range, etc.), remove the instrument from use and report the condition to the RSO or duly authorized representative.
- 3.1.2 Individuals performing work with an alpha/beta counter shall be familiar with the requirements set forth in the current and approved version of this procedure.

3.2 Limitations

3.2.1 This instrument should be set up for use in low background area as determined by the RSO or duly authorized representative.

3.3 Requirements

- 3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).
- 3.3.2 Survey instrument calibrations shall be performed by an NRC or Agreement State licensed calibration facility.

3.3.3 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.

4.0 REFERENCES

•	HASP	Safety and Health Program (Radiation Safety Program)
•	OP-001	Radiological Surveys
•	OP-002	Air Sampling and Analysis
•	NUREG-1556	Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.
- 5.2 Smear sample survey a technique using a two-inch diameter filter papers to determine removable contamination of alpha and/or beta emitting radioactive material.
- 5.3 Air sample survey a technique in which particulates are collected from a known volume of air drawn through a filter paper and concentrations of airborne alpha and beta activity associated with the particulates is determined by sample counting.
- 5.4 Plateau portion of a voltage curve where changes in operating voltage introduce minimum changes in the counting rate.
- 5.5 Chi-square test A statistical test to evaluate the operation of a sample counter by determining how data fit a series of counts to a Poisson distribution.
- 5.6 Daily calibration A determination of alpha and beta sample counting efficiency by counting National Institute of Standard Technologies (NIST) radioactive standards.

6.0 EQUIPMENT

Ludium model 2929 or equivalent

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of operating alpha/beta sample counters are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of alpha/beta sample counters described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT using alpha/beta sample counters are responsible for knowing and complying with this procedure.

8.0 OPERATION

- 8.1 Instrument Inspection
 - 8.1.1 Before each use, perform the following checks:
 - 8.1.1.1 Verify the instrument has a current calibration label.
 - 8.1.1.2 Visually inspect the instrument for physical damage or defects.
 - 8.1.2 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.1.1 through 8.1.1.2 and notify the RSO or his duly authorized representative.
- NOTE: Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or his duly authorized representative be notified.
 - 8.2 Initial Startup.
 - 8.2.1 Turn high voltage potentiometer to its lowest position (fully counterclockwise).
 - 8.2.2 Turn instrument on.

- 8.2.3 The operator can select one of four operational procedures depending on the function to be performed. Before performing any of the following complete steps 8.1.1 to 8.1.2.
 - a) Plateau Curve The Plateau Curve is used to find the proper operating voltage of the instrument and will be performed at the discretion of the RSO or duly authorized representative. This test shall be documented on the attached Form OP-021-01 or equivalent.
 - b) Chi-square Test The Chi-Square Test will be performed at the discretion of the RSO or duly authorized representative in order to test the operational adequacy of the instrument and will be recorded on Form OP-021-02. This test statistically evaluates the sample counter against a poisson distribution.
 - c) Daily Calibration Check This portion of the procedure is performed before samples are counted on any day the instrument is in use.

8.3 Plateau Curve

NOTE: Before beginning, record the previous calibration high voltage values.

- 8.3.1 Set up the instrument in a low background area.
- 8.3.2 Rotate the high voltage potentiometer slowly clockwise until the meter indicates proper voltage. This proper voltage is approximately 500 volts.
- 8.3.3 Set time multiplier switch to "x1."
- 8.3.4 Set the instrument-preset timer to one (1) minute.
- 8.3.5 Insert an alpha calibration standard into the center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a one minute count.
- 8.3.6 Upon completion of the count, record high voltage reading and digital counts appearing in the instrument alpha display in the indicated columns on Form OP-021-01(Plateau Data Sheet)
- 8.3.7 Continue increasing high voltage by 50-volt increments, as described above, obtaining counts and recording data until the end of the plateau is reached. If rapid increase in count rate is observed, proceed to step 8.3.8. If not, notify the RSO or duly authorized representative.

- 8.3.8 Remove the alpha source and replace with a beta source.
- 8.3.9 Reduce high voltage reading to the voltage level chosen during Step 8.3.2 by turning potentiometer counterclockwise.
- 8.3.10 Perform one-minute counts at 50-volt increments and record the data on Form OP-020-01, until the end of the plateau is reached. If a rapid increase in count rate is observed reduce the high voltage.
- 8.3.11 Using linear graph paper or equivalent plotting system, plot alpha and beta counts on the "Y" axis and the voltage for the indicated count on the "X" axis.
- 8.3.12 Select an operating voltage 1/3 the distance beyond the knee of the plateau curve by marking the voltage on the graph and on the plateau data sheet.
- 8.3.13 Sign and date Form OP-021-01 and forward the results along with any graphs produced to the RSO or duly authorized representative for review.

8.4 Chi-Square Test

- 8.4.1 Set up the Instrument in a low background area.
- 8.4.2 Ensure the high voltage potentiometer is positioned according to the posted instrument label. Adjust if necessary.
- 8.4.3 Set the time multiplier switch to "x1".
- 8.4.4 Set the instrument-preset timer to one (1) minute.
- 8.4.5 Insert the alpha calibration standard into center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a one minute count.
- 8.4.6 Upon completion of the count, record digital counts appearing in the alpha display in the "X_i" column on Form OP-021-02 (Chi -Square Data Sheet).
- 8.4.7 Repeat counting sequence without changing settings until a total of 20 counts have been taken and recorded in the "X_I" column on Form OP-021-02.
- 8.4.8 Add the 20 counts recorded in the " X_i " column and record in the "Sum" column. Then divide by 20 to obtain the mean number of counts (X_m) and record on the line " X_m ".

- 8.4.9 Calculate the individual count " X_i " difference from the mean (X_m) value and record in the " (X_i-X_m) " column on Form OP-021-02 for all 20 values.
- 8.4.10 Calculate $(X_i-X_m)^2$, sum the " $(X_i-X_m)^2$ " column, and record on Form OP-020-02.
- 8.4.11 Calculate the value of Chi- Square using the following formula.

$$X^{2} = \frac{\sum (X_{i} - X_{m})^{2}}{X_{m}}$$

- 8.4.12 The value of Chi-square should be between 8.91 and 32.8 (represents a probability between 0.025 and 0.975). Record this value at "X²". If the Chi-square value falls outside this range, contact the RSO or duly authorized representative for further instructions.
- 8.4.13 Sign and date Form OP-021-02 and forward the results to the RSO or duly authorized representative for review.
- 8.5 Daily Calibration Check
 - 8.5.1 Ensure the high voltage potentiometer is positioned according to the posted instrument label. Adjust, slowly, if necessary.
 - 8.5.2 Set time multiplier switch to "x1".
 - 8.5.3 Set the instrument-preset timer to five (5) minutes.
 - 8.5.4 Record the source type to be used and corresponding serial number on the proper line indicated on Form OP-021-03. Use separate rows of the form for each source efficiency to be calculated.
 - 8.5.5 Insert a blank sample into the center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a five minute background count.
 - 8.5.6 Calculate and record the background total counts and count rate in the columns labeled "Total Counts" and "BKG CPM" respectively, under Background Information on Form OP-021-03. The background count rate in CPM (counts per minute) can be calculated as follows:

$$CPM = \frac{Total Counts}{Total Time}$$

- 8.5.7 Remove the blank sample and insert the alpha or beta calibration standard into the center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a five minute count.
- 8.5.8 Upon completion of the measurement, calculate and record the total counts and count rate in the columns labeled "Total Counts" and "CPM" respectively, under Source Information on Form OP-021-03. The count rate (CPM) can be calculated as listed in Step 8.5.6.
- 8.5.9 Calculate Net Source CPM as below and record on Form OP-021-03 under "Net CPM".

Net Source CPM = CPM - BKG CPM

NOTE: Obtain activity (DPM) value from the source certification paperwork. Decay correct activity, if needed.

8.5.10 Use the source disintegration per minute (DPM) to calculate the efficiency as shown below and record as a decimal on Form OP-021-03.

% Efficiency=
$$\frac{Net\ Source\ CPM}{DPM}$$
*100

- 8.5.11 To calculate the efficiency for the next source, remove the current source standard, insert a new source standard and repeat steps 8.5.1 through 8.5.10, as necessary.
- 8.5.12 Remove calibration standards and place in source holders.
- 8.5.13 Generate a control chart tracking the daily efficiencies and notify the RSO or duly authorized representative if any point falls outside of 2σ variance.

NOTE: For the first day on control chart use five data points to begin trend line.

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 The alpha/beta sample counter will be checked for proper calibration daily with a NIST traceable source when in use.

- 9.1.2 Chi-square and plateau tests are verified and noted as currently valid.
- 9.1.3 The HPT shall ensure that the attachments are of the most current.

9.2 Records

- 9.2.1 Documented information shall be legible written in ink.
- 9.2.2 Data shall not be obliterated by erasing or using white-out. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed and dated.
- 9.2.3 The HPT shall review completed attachment forms for accuracy and completeness.
- 9.2.4 Entries on forms must be dated and initialed by the HPT to be valid.
- 9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

•	OP-021-01	Plateau Data Sheet
•	OP-021-02	Chi-Square Data Sheet
•	OP-021-03	Daily Calibration Check

OP-021-01

Plateau Data Sheet

Date:		_ Reco	mmended C	Operating Vo	oltage:			
Instrument	•		Serial Number:					
Alpha Sou	rce Serial N	0		Acti	vity (dpm)		·	
Beta Source	e Serial No	•	Activity (dpm)					
Voltage Setting	Alpha Counts	Voltage Setting	Alpha Counts	Voltage Setting	Beta Counts	Voltage Setting	Beta Counts	
•								
		·						
		,						
	·							
·			, .			•		
							·	
				,				
Prepared E	3y:					Date:		
•		·	Print/Sign					
Reviewed By: Date: Print/Sign								
OP-021-01			Cabrera Sei	vices. Inc		P	age 9 of 11	

OP-021-02

Chi-Square Data Sheet

pha Source No./Activity:_		Beta Source No./Activity	y:
Count Number	Xi	(X _I -X _m)	$(X_{l}-X_{m})^{2}$
1			
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P-021-02		ervices, Inc.	Page 10 of

OP-021-03

Daily Calibration Check

Instrument Serial No								
Alpha Source	e No./A	ctivity		Beta	Source No.	/Activity		
Background Information			Source Information					
Date/Time	Total Time	Total Counts	BKG CPM	Total Time	Total Counts	CPM	Net CPM	% Eff.
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OP-021-04			Cabro	e Convice	es. Inc.		Pos	e 11 of 11

1.0 PURPOSE

The purpose of this procedure is to provide instruction for the operation of the micro-R meter for gamma radiation surveys. Adherence to this procedure will provide reasonable assurance that the radiological surveys performed have reproducible results.

2.0 APPLICABILITY

This procedure will be used by Cabrera Services, Inc. (CABRERA) personnel operating the micro-R meter during gamma radiation surveys. The micro-R meter is used to determine gamma radiation levels from St. Albans VAECC facility surfaces, equipment, waste and source packages, etc., containing gamma emitting radioactive materials.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

- 3.1.1 Individuals performing work with the micro-R meter shall be familiar with the requirements set forth in the current and approved version of this procedure.
- 3.1.2 If any instrument inconsistencies are observed (e.g., unusually high or low background readings, source checks outside the acceptable range, etc.), remove the instrument from use, label it "OUT OF SERVICE" and report the condition to the Radiation Safety Officer (RSO) or duly authorized representative.

3.2 Limitations

None

3.3 Requirements

- 3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).
- 3.3.2 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.
- 3.3.3 Survey instrument calibrations shall be performed by an NRC or Agreement State licensed calibration facility.

4.0 REFERENCES

•	HASP	Safety and Health Program (Radiation Safety Program)
•	OP-001	Radiological Surveys
•	OP-009	Use and Control of Radioactive Check Sources
٠	OP-020	Operation of Contamination Survey Meters
•	NUREG-1556	Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.
- 5.2 Gamma Radiation Survey A survey technique to determine gamma radiation levels from radioactive material(s) in facilities, materials, landmasses, etc.
- 5.3 Acceptance Range A range of values that describe an acceptable daily instrument source check result.

6.0 EQUIPMENT

Ludlum Model 19 or equivalent

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of operating a micro-R meter is familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the operation of a micro-R meter described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT operating the micro-R meter are responsible for knowing and complying with this procedure.

8.0 OPERATION

- 8.1 Instrument Inspection
 - 8.1.1 Before each use, perform the following checks:
 - 8.1.1.1 Verify the instrument has a current calibration label.
 - 8.1.1.2 Visually inspect the instrument for physical damage or defects.
 - 8.1.1.3 Position the meter switch to "BAT". Check to see that the needle falls within the "Bat Test" checkband.
 - If the needle falls below the "Bat Test" checkband, install new battery(s).
 - If the needle still falls outside the "Bat Test" checkband after the installation of new battery(s), tag the instrument "Out of Service" and notify the RSO or duly authorized representative.
 - 8.1.2 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.1.1 through 8.1.1.3 and notify the RSO or duly authorized representative.
- NOTE: Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or duly authorized representative be notified.
 - 8.2 Pre-operation of instrument
 - 8.2.1 Position the meter fast/slow ("F/S") switch to "S".
 - 8.2.2 Position the meter switch to the appropriate range scale.
 - 8.2.3 If a Quality Control (Q.C.) acceptance range has not already been calculated, then follow the instructions below, other wise proceed to step 8.2.5.
 - 8.2.3.1 Ensure the source and detector are in documented reproducible positions, which will be used each time this check is performed. Document this position on appropriate form.
 - 8.2.4 Place the QC check source and detector in the documented position on appropriate form.

- 8.2.5 Allow the instrument reading to stabilize (approximately 30 seconds). Compare the reading to the response check criteria. If the response reading falls outside of the acceptance range, tag the instrument "Out of Service," and notify the RSO or duly authorized representative.
- 8.3 Operation of the instrument
 - 8.3.1 Grid Surveys
 - 8.3.1.1 Turn the audio switch to the "On" position.
 - 8.3.1.2 Verify the instrument selector switch is on the lowest scale (usually the μR position). Turn the instrument selector switch to the next higher scale only if meter indication is off scale.
 - 8.3.1.3 For a stationary grid reading in a facility or land mass, position the instrument one meter above the surface to be surveyed and allow meter to stabilize. With the instrument toggle switch set in the "SLOW" position, the meter reaches 90% of its final reading in 22 seconds. Record the average meter indication in μR/hr on appropriate form(s).

Note:

Two survey methods (step 8.3.1.4 or 8.3.1.5) can be used to obtain contact readings in the survey grids. The survey method used will be specified in the site specific work plan.

8.3.1.4 For a scan survey, make sure the meter response is set to fast and suspend the instrument from a strap which locates the detector at surface or ground level. Move the instrument slowly over the surface while walking in an "S" pattern unless otherwise instructed by the RSO or duly authorized representative. Areas, which could concentrate radioactive materials such as drainage ditches, floor cracks, and wall/floor joints, should be surveyed. Observe meter indication and listen for increases in audible clicks from the speaker. If elevated readings above background are observed, a stationary survey shall be performed (at onemeter height and at the surface) at the point of elevated activity. Record area meter indications above background in μR/hr on appropriate form.

8.3.1.5 As an alternate to the "S" pattern survey used in step 8.3.1.4, the survey grid can be divided into subgrids and readings taken as directed by the site work plan. Elevated measurements should be performed in the same manner as above (i.e., at one meter and at the surface). The readings from each measurement are recorded on appropriate form.

8.3.2 Waste Container Surveys

- 8.3.2.1 Set the instrument scale to accommodate the highest expected radiation level. If radiation levels may approach 5000 μR/hr (5 mR/hr) obtain an instrument with appropriate range before performing any radiation surveillance.
- 8.3.2.2 Slowly scan the total surface of the package and record the maximum contact reading obtained on appropriate forms.
- 8.3.2.3 Obtain instrument readings at one meter from all sides of the package and record the maximum reading obtained on appropriate form.

8.3.3 Final Verification

Upon completion of work activities, repeat steps 8.1.1.1 through 8.2.2 and 8.2.4 through 8.2.5, as a final verification that the instrument is working properly

8.3.4 Additional Information

- 8.3.4.1 In a uniform background radiation field (without interfering sources of radiation), methods such as selectively shielding the detector, soil sample analysis, etc., can be used to differentiate between extraneous radioactive sources (e.g., skyshine or radioactive waste shipment containers), naturally occurring radioactive material and/or radioactive contamination.
- 8.3.4.2 Note the location of installed devices, which contain radioactive material and could cause elevated background radiation levels in localized areas.
- 8.3.4.3 Land mass surveys might contain areas with naturally occurring radioactive materials, which will elevate background radiation levels.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 The health physics technician performing the survey shall ensure that this procedure is current.

9.2 Records

9.2.1 Documented information shall be legibly written in ink.

St. Albans Project 00-062

- 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.3 The health physics technician performing the survey shall review appropriate forms and any other applicable forms for accuracy and completeness.
- 9.2.4 Entries must be dated and initialed by the health physics technician performing the survey to be valid.
- 9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

None

1.0 PURPOSE

The purpose of this procedure is to provide instructions for the proper set-up, calibration and data acquisition for the PSR-4 Proportional Probe to be used at the St. Albans Extended Care Facility in the Ejector Pit Room's four-inch diameter underground cast iron pipe.

2.0 APPLICABILITY

This procedure is to be used only in the St. Albans Ejector Pit four-inch diameter underground cast iron pipe. This is because the concept of the probe is to use the eight spring loaded rollers to center the detector within the pipe.

3.0 PRECAUTIONS, LIMITATIONS

- 3.1 Ensure that safety line is attached to the probe before placing it in the pipe.
- 3.2 The only radionuclide monitored at St. Albans is Strontium-90 or daughter products of Strontium-90.
- 3.3 The calibration of this probe will be performed with a Strontium-90 National Institutes of Standards & Technology (NIST) traceable source.
- 3.4 The P-10 gas cylinder should be properly secured to prevent improper movement.
- 3.5 Pressure regulator attachment should fit snug to gas cylinder.
- 3.6 Plastic sheeting should cover cable to prevent contamination.

4.0 REFERENCES

4.1	10 CFR 20	Standards for Protection Against Radiation
4.2	AP-012	Radiation Work Permits
4.3	OP-001	Radiological Surveys
4.4	OP-002	Air Sampling and Analysis
4.5	OP-019	Radiological Posting
4.6	OP-021	Alpha-Beta Counting Instrumentation

St. Albans Field Operations Procedure for the PSR-4 Proportional Probe Rev. 0

5.0 DEFINITIONS

- 5.1 Activity The rate of disintegratation or decay of radioactive material. The units of radioactivity for the purposes of this procedure are disintegrations/minute.
- 5.2 Radiological Controlled Area A work area whose access is restricted to authorized and trained personnel by the use of a Radiation Work Permit due to one or more of the following conditions: radiation area, high radiation area, contaminated area, highly contaminated area or airborne area.
- 5.3 Survey An evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal or presence of radioactive material or other sources of radiation.

6.0 EQUIPMENT

- 6.1 PSR-4 Probe with Cable.
- 6.2 P-10 Gas with Pressure/Reducer Regulator.
- 6.3 Safety Cable.
- 6.4 Plastic Tubing.
- 6.5 Ludlum 2221 Scaler Rate Meter.
- 6.6 NIST traceable SR-90 source.

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) is responsible for ensuring that personnel assigned the task of surveying materials are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of contamination survey meters described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT is responsible for performing the surveys performed in this procedure.

St. Albans Field Operations Procedure for the PSR-4 Proportional Probe Rev. 0

8.0 INSTRUCTIONS

- 8.1 Connect one end of the gas/HV cable to the PSL-4 probe. Connect the other end to the Ludlum 2221 Scaler/Rate meter. Connect the P-10 gas supply as well.
- 8.2 The calibration of the PSR-4 probe is performed before using it at the St. Albans site. Readings are taken with an Sr-90 NIST traceable 1.25" diameter source. The adjusted net counts are calculated per square centimeter source area and an efficiency (cpm/dpm) is determined.
- 8.3 Background counts must be subtracted from the gross count readings to determine net counts. Background counts can be significantly higher in the Pit Ejector Room due to the presence of natural radon/thoron from the concrete walls and floors. A concerted effort must be made to reduce the background levels by using forced ventilation.
- 8.4 Gas purge should be 15-20 minutes at 100 cc/min.
- 8.5 A safety line should be attached to the probe to pullout should it get stuck. (Note: The P-10 gas/Ludlum 2221 line should not be used as the safety line.)
- 8.6 Place yellow plastic sleeving (two inches wide) around the probe cable to prevent contamination.
- 8.7 When moving/guiding probe into pipe, take a one-minute count every four inches.
- 8.8 Mark gas/HV cable with foot measuring tape to accurately determine depth and positioning in the pipe.
- 8.9 A number of Quality Assurance counts should be performed at pre-determined locations to determine the reproducibility of the data.

Revision 0 10/13/2000 WATER EVAPORATION FROM CONTAINERS WITHIN RADIOLOCIAL CONTROLLED AREAS

St. Albans Project 00-062

1.0 PURPOSE

The purpose of this procedure is to specify process requirements for evaporating water potentially containing radioactive material spilled in a radiological controlled area by enhanced evaporation methods. This procedure sets forth the specific requirements to assure this process does not release radioactive materials from a radiological controlled area.

2.0 APPLICABILITY

2.1 The procedure will be used to ensure that airborne particulates and effluents released to the environment by this process do not exceed criteria applicable to the license conditions at St. Albans VAECC facility or as specified in regulations or guidance provided by applicable regulatory agencies of the federal or state government.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

- 3.1.1 Instruments used to perform airborne surveys shall be operated in accordance with the respective operating procedures.
- 3.1.2 The approved methods for this enhanced evaporation process are heat lamps and/or immersion heaters.
- 3.1.3 The approved rate of evaporation by these processes shall be to a mild boil or mild simmering level.

3.2 Limitations

- 3.2.1 All evaporation shall be performed inside the radiological controlled area. Only water may be evaporated.
- 3.2.2 The evaporation process shall be performed only when Cabrera personnel are physically at the job site.
- 3.2.3 The only radionuclide monitored at St. Albans is Strontium-90 or daughter products of Strontium-90.
- 3.2.4 All vapors, fumes or particulates generated by this process shall be capable of being captured and detected by the air monitoring system in place.

Revision 0 10/13/2000 WATER EVAPORATION FROM CONTAINERS WITHIN RADIOLOGIAL CONTROLLED AREAS

St. Albans Project 00-062

3.2.5 This process shall not be used for water containing tritium or volatile radioactive species such as iodine.

3.3 Requirements

None

4.0 REFERENCES

 10 CFR 20 	Standards for Protection Against Radiation
• AP-012	Radiation Work Permits
• OP-001	Radiological Surveys
 OP-002 	Air Sampling and Analysis
 OP-019 	Radiological Posting
• OP-021	Alpha-Beta Counting Instrumentation
 NUREG-1556 	Consolidated Guidance About Material Licenses (Vol.11)
 Reg 1.86 	Termination of Operating Licenses for Nuclear Reactors

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Activity The rate of disintegration (transformation) or decay of radioactive material. The units of activity for the purpose of this procedure are Becquerel (Bq) or micro-Curies (μCi).
- 5.2 Air Sample Survey A survey technique which collects particulates from a known volume of air and determines the concentrations of radioactive materials associated with the airborne particulates.
- 5.3 Radiological Controlled Area A work area whose access is restricted to authorized and trained personnel by use of a Radiation Work Permit due to one or more of the following conditions: radiation area, high radiation area, contaminated area, highly contaminated area or airborne area.
- 5.4 Survey is defined as an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

6.0 EQUIPMENT

6.1 Low-Volume air sample pump with particulate filter paper.

7.0 RESPONSIBILITIES

Revision 0 10/13/2000 WATER EVAPORATION FROM CONTAINERS WITHIN RADIOLOGIAL CONTROLLED AREAS

St. Albans Project 00-062

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of surveying materials are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of contamination survey meters described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT are responsible for performing the surveys described in this procedure.

8.0 INSTRUCTIONS

- 8.1 Water containing the potentially contaminated radioactive material to be evaporated is to be placed inside a container within the radiological controlled area.
- 8.2 Follow any specific requirements per the manufacturer regarding the assembly and/or placement of the evaporating enhancement device.
- 8.3 Place low volume air sampling pump with filter assembly within three feet of the top of the container. Start pump at the beginning of the evaporation process.
- 8.4 Perform periodic checks of the evaporation process as well as pump operability.
- 8.5 At the conclusion of the evaporation process for each day, shut off the evaporation device as well as the sample pump.
- 8.6 Count the filter paper with an alpha/beta proportional counter. If pure gamma emitting isotopes are present, the RSO/RFS should consider other appropriate counting equipment.
- 8.7 Monitoring of effluents released to the environment by this process will likely have lower concentration limits. Assume sufficient sampling volume is captured for these monitoring points to meet environmental minimum detectable activities.

Revision 0 10/13/2000 WATER EVAPORATION FROM CONTAINERS WITHIN RADIOLOCIAL CONTROLLED AREAS

St. Albans Project 00-062

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 Instrumentation used for surveys will be checked with standards each day prior to use and verified to have current valid calibration.
 - 9.1.2 The health physics technician performing the survey shall review Form OP-025-01 for accuracy and completeness.

9.2 Records

- 9.2.1 Documented information shall be legibly written in ink.
- 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.3 The health physics technician performing the survey shall ensure that this procedure is the most current and approved revision.
- 9.2.4 Entries on Form OP-025-01 and any other pertinent forms must be dated and initialed by the health physics technician performing the survey to be valid.
- 9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

1.0 PURPOSE

This procedure provides the methods Cabrera Services, Inc. (CABRERA) use to control recognition of radioactive materials and areas. Adherence to this procedure will provide reasonable assurance that personnel will remain free of contamination, contamination will not spread beyond the designated contamination area, and personnel exposures will be maintained As Low As Reasonably Achievable (ALARA).

2.0 APPLICABILITY

This procedure will be used by CABRERA personnel to control and contain radioactive materials. The following are types of controls methods that will be employed:

- Posting requirements for radioactive materials.
- · Establishing and posting radiation areas.
- Establishing and posting contaminated areas.
- Establishing and posting airborne radioactivity areas.

3.0 PRECAUTIONS, LIMITATION, AND REQUIREMENTS

3.1 Precautions

3.1.1 If a HPT is unable to perform this procedure due to errors, extenuating circumstances, or for any reason, the HPT shall immediately stop and notify the RSO.

3.2 Limitation

None

3.3 Requirements

None

4.0 REFERENCES

10 CFR 20, Subpart F	Surveys and Monitoring
10 CFR 20.2103	Records of Surveys
HASP	Health and Safety Program
OP-020	Operation of Contamination Survey Instrument
OP-021	Alpha-Beta Sample Counting Instrument
OP-022	Operation of Ionization Chambers
	10 CFR 20, Subpart F 10 CFR 20.2103 HASP OP-020 OP-021 OP-022

• OP-023

Operation of Micro-R Survey Meters

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area to which access is controlled to protect individuals against undo risks from exposure to radiation and radioactive materials.
- 5.2 Contamination Survey A survey technique to determine fixed and removable radioactive contamination on components and facilities.
- 5.3 Radiation Survey is defined as an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.
- 5.4 ALARA (acronym for "as low as is reasonably achievable") An approach to radiation exposure control to maintain personnel radiation exposures as far below the federal limit as technical, economical and practical considerations permit.
- 5.5 Radioactive Materials Materials containing or capable of emitting alpha particles, beta particles, gamma rays, X-rays, neutrons and/or other ionizing radiations.
- 5.6 Airborne Radioactivity Area A room, enclosure or area in which radioactive material is dispersed in the form of dusts, fumes, mists, vapors, or gases and the concentration of the of the dispersed radioactive materials in excess of:
 - 5.6.1 The derived air concentrations (DAC's) specified in Table 1, Column3 of Appendix B, Title 10 Part 20 of the Code of Federal Regulations.
 - 5.6.2 Concentrations such that an individual present in the area without respiratory protective equipment could exceed, during the hours the individual is present in a week an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC-hours.

6.0 EQUIPMENT

None Required

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of establishing and posting restricted areas are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation safety Officer (RSO) The RSO is responsible for monitoring compliance with this procedure and training personnel in establishing and posting restricted areas. The RSO can also assist in the interpretation of the results obtained during surveys.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT establishing and posting restricted areas are responsible for knowing and complying with this procedure.

8.0 INSTRUCTIONS

- 8.1 Posting Requirements for Radioactive Materials
 - 8.1.1 Any area or room in which there is used or stored an amount of licensed material exceeding 10 times of the quantity of such material specified in Appendix C, Title 10 Part 20 of the Code of Federal Regulations shall be posted with a sign or signs "Caution Radioactive Materials Area" or "Danger, Radioactive Materials".
 - 8.1.2 When posting a room as required in step one, a sign should be placed on each entrance door to the room. If the area to be posted is not a room, the area containing the license material shall be bounded by a yellow and magenta/black rope or ribbon securely fastened to stanchions, posts or other durable devices and signs shall be displayed in all accessible directions.
 - 8.1.3 Any container, which contains licensed material in quantities equal to or greater that the quantities listed in Appendix C, Title 10 Part 20 of the Code of Federal Regulation shall be posted with a sign or label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIALS" OR "DANGER, RADIOACTIVE MATERIALS".

- 8.1.4 When posting a container as required by step three, the label should also state the radionuclide present in the container, the activity in the container, the date at which the activity was determined, the radiation levels emanating from the unshielded radioactive source, and the levels from the container holding the radioactive source.
- 8.1.5 Posting of containers is not required if the containers are in transport and packages and labeled in accordance with the regulations of the Department of Transportation. (Title 49 Parts 172 and 173 of the Code of Federal Regulations). Containers, which are awaiting shipment at a facility, are subject to posting requirements as specified in 8.1.1
- 8.2 Establishing and Posting Radiation Areas
 - 8.2.1 Any area accessible to personnel in which there exists ionizing radiation at dose rate levels such that an individual could receive a deep dose equivalent in excess of 5 mrem in 1 hour at 30 cm from the source of from any surface that the radiation penetrates shall be identified and posted with a sign "CAUTION RADIATION AREA".
 - 8.2.2 A Micro-R Meter or other calibrated dose rate meter is used to identify the boundary location of the 5 mrem/hr dose rate.
 - 8.2.3 If an entire room or most of the room is at or above the 5 mrem/hr level, a sign should be placed on each entrance door to the room. If the area to be posted is not a room, the area at or above the 5 mrem/hr level shall be bounded by a yellow and magenta/black rope or ribbon securely fastened to stanchions, posts or other durable device and signs shall be displayed in all accessible directions.
 - 8.2.4 An exemption to this posting requirement is allowed in areas or rooms containing radioactive materials for periods less than 8 hours, if each of the conditions is met:
 - 8.2.4.1 The materials are constantly attended to during these periods by an individual who takes the precautions necessary to prevent the exposure to radiation or radioactive materials in excess of the limits specified in the RSP; and
 - 8.2.4.2 The area or room subject to the licensee's control. For example, the area around the truck loading radioactive waste does not require posting if the above conditions are met.
 - 8.2.5 If the dose rates above 100 mrem/hr are encountered, control access to the area and contact the RSO or duly authorized representative for posting instructions.

8.3 Establishing and Posting Contaminated Areas

- 8.3.1 A restricted area that has fixed and removable radioactive materials in the form of dusts, particulates or sorbed contaminants which are above the limits specified in the RSP shall be identified and posted with a "CONTAMINATED AREA" sign.
- 8.3.2 Contamination levels are determined using procedure OP-001 (Radiological Surveys) and the results of the survey measurements compared to the contamination limits specified in the RSP.
- 8.3.3 If an entire room or most of the room is above the contamination criteria, a sign should be placed on the entrance door to the room. If the area to be posted is not a room, the above area contamination criteria shall be bounded by a yellow and magenta/black rope or ribbon securely fastened to stanchions, posts or other durable device and signs displayed in all accessible directions.
 - 8.3.3.1 A single entry point shall be established to access the contaminated area. A step-off pad is placed at the entry point, which provides a defined boundary between contaminated and restricted areas.
 - 8.3.3.2 Receptacles for protective clothing and waste materials shall be placed just inside the entry point to collect protective clothing from personnel exiting the area.
 - 8.3.3.3 If work activities in the work areas are likely to generate significant dusts containing radioactive materials, the area should be enclosed within a containment to prevent the spread of contamination beyond the identified contaminated area.
- 8.4 Establishing and Posting Airborne Radioactivity Areas
 - 8.4.1 CABRERA's policy is to minimize (and protect, if practical) the amount of radioactive materials taken into a workers body. In order to accomplish this, Airborne Radioactivity Areas are posted at 10% DAC, as specified in Table 1, Column 3 of Appendix B of 10 CFR 20. Maintaining the airborne activity below these limits will eliminate any posting requirements.

- 8.4.2 To verify that these limits are not exceeded, an air sample is taken during each work activity, which could create an airborne radioactivity hazard. The results of these samples are compared with the above limits to verify the limits are not exceeded. If these limits are exceeded, immediately contact the RSO or duly authorized representative.
- 8.4.3 A room, enclosure or area shall be posted with a "CAUTION, AIRBORNE RADIOACTIVITY AREA" or "DANGER, AIRBORNE RADIOACTIVITY AREA" if radioactive material is dispersed in the form of fumes, dusts, mists, vapors, or gases and the contamination of the dispersed radioactive materials is in excess of:
 - 8.4.3.1 The derived air concentration (DAC) specified n Table 1, Column 3 of Appendix B, Title 10 Part 20 of the Code of Federal Regulations.
 - 8.4.3.2 Concentration such that an individual present in the area without respiratory protective equipment could exceed, during the hours the individual is present in a week, an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC-hours.
- 8.4.4 If sampling results identify a room, enclosure, or area that requires posting as specified in 8.4.3, immediately stop work activities and contact the RSO or duly authorized representative for instructions.

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 Instrumentation used in the surveys will be checked with standards daily and verified to have current valid calibration.

9.2 Records

- 9.2.1 Record any radioactive materials posting made in the project logbook. Include the date, location, and all information posted.
- 9.2.2 Record the date and the location of any radiation areas established in the project logbook. Include a sketch of the area and radiation area boundary on survey forms.
- 9.2.3 Record the date and location of any contaminated areas established in the project logbook. Include a sketch of the area and contaminated area boundary on survey forms.

- 9.2.4 Record the date and location of any airborne radioactivity areas established in the project logbook. Include a sketch of the area on survey forms. Indicate time and date of any notifications required by this procedure.
- 9.2.5 Document and record radiological survey records, routine survey schedules, and tracking forms that are generated during the performance of this procedure.
- 9.2.6 Documented information shall be legibly written in ink.
- 9.2.7 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.8 The HPT performing the posting shall ensure that this procedure is the most current and approved revision.
- 9.2.9 The HPT performing the posting shall review Forms and any other applicable forms for accuracy and completeness.
- 9.2.10 Entries on Forms and any other pertinent forms must be dated and initialed by the HPT performing the posting to be valid.
- 9.2.11 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

None

1.0 PURPOSE

The purpose of this procedure is to establish the framework and to define the requirements for Cabrera Services, Inc., (CABRERA) personnel performing radiological surveys. Adherence to this procedure will provide reasonable assurance that the radiological surveys performed maintain reproducible results. In addition, adherence to this procedure will provide adequate control of radiation exposures As Low As Reasonably Achievable (ALARA).

2.0 APPLICABILITY

This procedure provides the requirements for identifying, scheduling, and performing routine, clean area, radiation, contamination, and airborne surveys by radiation safety personnel. All remediation and facility areas that are radiologically controlled as well as non-radiologically controlled areas containing fixed contamination and areas adjacent to contaminated areas are within consideration for routine survey performance. This procedure does not include survey requirements for radiation generating devices and survey requirements specified in radiation work permits (RWP's).

This procedure will be used by CABRERA personnel to perform radiation and contamination surveys at St. Albans VAECC facilities. The following types of surveys may be performed using this procedure.

- · Surveys performed for shipping radioactive materials.
- Surveys performed to characterize facilities, sites, and items contaminated with radioactive materials.
- Surveys performed to provide radiological support for decontamination and decommissioning facilities and sites.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

- 3.1.1 Instruments used to perform routine surveys shall be operated in accordance with the respective operating procedure.
- 3.1.2 Large area smears may be used to augment (but not replace) the 100 cm² smear survey. Large area wipes may be counted with the Ludlum Model-3 or equivalent. Large area smears are used to obtain immediate information concerning loose contamination for the purpose of radiological protection and to minimize time spent performing disc smears on an item easily identified as contaminated.

- 3.1.3 Personnel performing routine surveys shall be logged in on a Radiation Work Permit in accordance with AP-012 (if applicable).
- 3.1.4 Audible response instruments should be used during direct scan surveys.
- 3.1.5 The instruments used for routine or special surveys shall be within current calibration and shall have had a performance test check performed daily or before use in accordance with the instrument's operating procedure.

3.2 Limitations

- 3.2.1 The maximum probe speed during direct scan surveys of surfaces shall be 3 cm/sec.
- 3.2.2 The probe face shall be held within ¼ inch of the surface being surveyed for alpha radiation, and within ½ inch of the surface being surveyed for beta-gamma radiation.
- 3.2.3 If an instrument used to perform routine surveys fails any operational check, it shall be removed from service. All data collected during the period of instrument failure must be evaluated by the RSO or duly authorized representative.
- 3.2.4 Posting of radiological control areas shall be performed in accordance with OP-019.

3.3 Requirements

- 3.3.1 Obtain and review any previous surveys performed in the area to determine radiation conditions which will be encountered.
- 3.3.2 Before performing any survey using this procedure, the HPT shall be trained. The training shall allow the HPT to perform surveys independently.
- 3.3.3 To ensure achieving the required sensitivity of measurements, survey samples will be analyzed in a low-background area.
- 3.3.4 Dose rate surveys, at a minimum, should be performed in locations where workers are exposed to radiation levels that might result in radiation doses in excess of 10% of the occupational dose limits or where an individual is working in a dose rate area of 2.5 mrem/hr or more.

3.3.5 If contamination is found in unrestricted areas, prevent access to the area and immediately notify the RSO or duly authorized representative.

4.0 REFERENCES

•	10 CFR 20, Subpart F	Surveys and Monitoring
•	10 CFR 20.2103	Records of Surveys
•	HASP	Safety and Health Program (RSP)
•	AP-012	Radiation Work Permits
•	OP-018	Decontamination of Equipment and Tools
•	OP-19	Radiological Posting
•	OP-020	Operation of Contamination Survey Meters
•	OP-021	Alpha-Beta Counting Instrumentation
•	OP-022	Operation of Micro-R Meters
•	OP-023	Operation of Ionization Chambers
*. • -	NUREG-1556	Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.
- 5.2 Contamination Survey A survey technique to determine fixed and removable radioactive contamination on components and facilities.
- 5.3 Radiation Survey is defined as an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.
- 5.4 ALARA (acronym for "as low as is reasonably achievable") An approach to radiation exposure control to maintain personnel exposures as far below the federal limits as technical, economical and practical considerations permit.

6.0 EQUIPMENT

All instruments used to perform routine surveys shall be used in accordance with the applicable CABRERA administrative and operational procedures. Authorized suppliers of properly calibrated and maintained equipment will supply all instruments.

Radiation and Contamination survey meters will be selected based on job specific requirements and will be identified in the Site Specific Work Plan.

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of performing routine surveys are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation safety Officer (RSO) The RSO is responsible for monitoring compliance with this procedure and training personnel in performing radiation and contamination surveys. The RSO can also assist in the interpretation of the results obtained during surveys.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT performing radiation and contamination surveys are responsible for knowing and complying with this procedure.

8.0 INSTRUCTIONS

8.1 Safety Considerations

The safety requirements specified in the job specific HASP and Work Plans, along with the Radiation Safety Program, and other safety documentation must be adhered to when performing surveys.

8.2 Initial Preparations

Obtain and review any previous surveys performed in the area to determine radiation conditions, which will be encountered.

- 8.2.1 Obtain appropriate survey instruments and prepare the instruments for use.
- 8.2.2 Obtain necessary forms, smears, and protective clothing, which will be used during the survey.
- 8.2.3 Plan the strategy for performing the survey before entering the area to reduce exposure time within the area.
- 8.2.4 If smearable contamination is expected to be above allowable limits, set up an anticipate entry into the area which will prevent the spread of contamination in the area.

8.3 Radiation Surveys

- 8.3.1 If radiation levels are unknown or previous surveys remain in question, first measure general area radiation levels using a Micro-R Meter or equivalent dose rate meter to determine if elevated radiation levels exist in the survey area.
- 8.3.2 Small Areas/Items/Waste Containers This survey technique is used to establish exposure rates from small areas, items, or containers, which contain radioactive materials.
 - 8.3.2.1 Scan the entire surface area of the area, item, or container with a Micro-R or equivalent meter and record locations and readings on OP-001-02 or equivalent form.
 - 8.3.2.2 Measure the exposure rate at 30 centimeters from all surfaces or sides of the area, item, or container and record the location and readings on OP-001-02 or equivalent form.
- 8.3.3 Facility Surveys This survey technique is used to release facilities (buildings etc.) to "unrestricted" status or determine status of facilities requiring decontamination and decommissioning. Final release of a facility will be established using MARSSIM guidance.
 - 8.3.3.1 Establish a 1 meter by 1 meter grid system of the facility surfaces using a marking system that assigns a unique number/letter system to the center of each grid. Graphically illustrate the location of the grid system on OP-001-02 or equivalent form.
 - 8.3.3.2 Using a Micro-R Meter, obtain radiation levels at 1 meter from the grid center point and at contact with the grid center point. Record reading on OP-001-02 or equivalent Form. If elevated readings are noted, scan the surface of the grid and note location of any elevated readings with a marker and on OP-001-02 or equivalent Form.
 - 8.3.3.3 Obtain 4 Micro-R readings from locations surrounding the facility or within the facility, which do not contain activity. This establishes a background level for comparison to the reading taken in step 8.2.3.2 above.
- 8.3.4 Area Surveys This survey technique is used to release land masses to "unrestricted" status or determine status of areas requiring decontamination before release. Final release of a site area will be established using MARSSIM guidance

- 8.3.4.1 Establish a 10 meter by 10 meter grid system of the area to be surveyed using surveyor stakes or equivalent, which are numbered with a unique number/letter system to identify the center of each grid. List the locations of the "gridded" system on OP-001-02 or equivalent form.
- 8.3.4.2 Using a Micro-R meter, obtain radiation levels at 1 meter from the grid corner point and at contact with the surface of the ground. Record all readings on OP-001-02 or equivalent Form.
- 8.3.4.3 Survey the remainder of the grid at the surface using an "S" walking pattern. If elevated readings are noted above or below the grid center point reading, subdivide the grid into 9 subgrids (3 subgrids X 3 subgrids) and obtain readings at 1 meter above the ground surface, and obtain contact readings in the center of the each subgrid. Record all readings on OP-001-02 or equivalent.

8.4 Contamination Surveys

- 8.4.1 If removable contamination is suspected or previous surveys are in question, first scan likely contaminated area with an α and/or β probe to determine if elevated areas of contamination exists. Obtain smear samples from any elevated areas and count smears in sample counter. If smearable contamination is found, use appropriate protective clothing and entry control techniques to prevent the spread of contamination.
- 8.4.2 Small Areas/Items/Waste Containers This survey technique is used to establish contamination levels on small areas, items, or containers, which contain radioactive materials.
 - 8.4.2.1 If the area, item, or waste container contains alpha activity, scan the area with an alpha probe at ¼ inch above the surface. Note readings on OP-001-02 or equivalent Form.
 - 8.4.2.2 If the area, item, or waste container contains beta activity, scan the area with a beta probe at approximately ½ inch above the surface to be surveyed and obtain reading following meter stabilization. Record meter reading on OP-001-02 or equivalent form. The surface of the waste container can be surveyed for beta activity only if the radiation level from the container does not elevate the beta probe background. If the background level is below 200

- CPM, scan the surface of the container and note readings on appropriate survey form.
- 8.4.2.3 To determine the removable surface contamination on area or items, first take a large area smear (LAS) using a paper hand towel or Maslin cloth and count the smear in a low background area using the alpha and beta probes. If no contamination is found on the LAS, take 100 cm² smear for every 2 square foot of surface area and count smears for alpha and beta activity. Record results on OP-001-02 or equivalent form.
- 8.4.2.4 For waste containers, a LAS should be taken from the bottom, top, and sides of the container. If no contamination is found on the LAS, take 300 cm² smears for every 2 square foot of surface area and count smears for alpha and beta in a sample counter. Take one smear each from the container sealing area, lid, and container contact points with ground or floor. Record all results of smear activity on OP-001-02 or equivalent Form. If contamination levels are above limits, decontaminate the surface of the container and repeat survey.
- 8.4.2.5 Facility Surveys This survey technique is used to aid in the release of facilities (buildings etc.) to "unrestricted" status or determine status of facilities requiring decontamination and decommissioning.
- 8.4.2.6 The grid system established in section 8.3.3.1 will also be utilized for contamination surveys.
- 8.4.2.7 Hold the beta probe at approximately ½ inch above the grid center point and obtain reading following meter stabilization. Record the meter reading on OP-001-02 or equivalent form.
- 8.4.2.8 If the readings are at background levels, randomly scan the remainder of the grid, concentrating on cracks, floor/wall joints, top of horizontal surfaces, ventilation ducts and grills, and other areas that might collect radioactive materials.

 Mark any locations above the release criteria on OP-001-02 or equivalent form.
- 8.4.2.9 If readings are at or near the release levels, scan grid surface and identify portion of the grid that is above the release criteria. Note these areas on the survey form and

mark the area of the grid with spray marker (or equivalent) on OP-001-02 or equivalent form.

- 8.4.2.10 Repeat steps 8.4.2.7 through 8.4.2.9 with an alpha probe at ¼ inch above the grid center point. If sufficient documentation of previous history is known about the facility, the alpha survey may not be required if:
 - The alpha contamination is known not to be present, or
 - The alpha measurements can be randomly taken of every 10th grid.
- 8.4.2.11 One smear sample from a 100cm² area will be taken in each grid. If the above survey found no elevated readings in the grid, the smear sample will be taken in the center of the grid. If elevated levels readings are identified the smear sample will be taken from the area where the highest reading was obtained.
- 8.4.2.12 Each smear sample will be labeled with the grid location and counted for alpha and beta activity in the sample counter. The smear sample results will be recorded on OP-001-02 or equivalent Form.
- 8.4.3 Area Surveys This survey technique is used to aid release of land masses to "unrestricted" status or determine status of area requiring decontamination before release.
 - 8.4.3.1 The grid system established in section 8.2.4, step 8.2.4.1 will also be utilized for contamination surveys.
 - 8.4.3.2 Hold the beta probe at ½ inch above the grid center point and obtain reading following meter stabilization. Record the meter reading on OP-001-02 or equivalent form.
 - 8.4.3.3 If readings are at background levels, randomly scan the remainder of the grid. Mark any locations above release criteria on OP-001-02 or equivalent form.
 - 8.4.3.4 If readings are at or near the release levels scan the grid surface and identify portion of the grid that is above release criteria. Note these areas on OP-001-02 or equivalent form.
 - 8.4.3.5 Areas contaminated with radioactive materials may require soil sample analysis to determine the activity concentration.

The quantity and location of samples will be determined on a case-by-case basis.

8.5 Frequency and Requirements for Routine Surveys

Appropriate routine radiological surveys shall be performed at the following frequencies as a minimum:

8.5.1 Radiation Surveys

- Upon initial entry after extended periods of closure
- Daily, at contamination control points, where the potential exists for personnel to be exposed to radioactive contamination
- Daily, during continuous operation, and when levels are expected to change in High Radiation Areas
- Weekly, in routinely occupied areas adjacent to radiological control areas
- Weekly for operating HEPA-filtered ventilation units
- Weekly, for any temporary Radiation Area boundaries to ensure that the Radiation Areas do not extend beyond posted boundaries
- Monthly, or upon entry if entries are less than monthly, for Radioactive Material Storage Areas
- Monthly, for potentially contaminated ducts, piping, and hoses in use outside the radiological facilities

8.5.2 Contamination Surveys

- Daily, at contamination control points, personnel protective equipment change out areas, or step-off pads, when in use or once per shift in high use situations
- Daily, in office spaces located in the radiological control areas
- Daily, in lunchrooms or eating areas adjacent to radiological control areas
- Weekly, for all designated lunchrooms supporting the project
- Weekly, in routinely occupied locker rooms or the shower areas

adjacent to radiological control areas

- Weekly, or upon entries, if entries are less frequent, in radiological control areas
- Weekly, or upon entries, if entries are less frequent, in the areas where radioactive materials are handled or stored
- Weekly for all project offices on site
- Monthly, in areas with fixed contamination

8.5.3 Airborne Surveys:

Airborne survey frequency, locations, and methods are determined by the radiation work permits (RWP's) and by the RSO.

- 8.6 Identifying and Scheduling Routine Radiological Surveys
 - 8.6.1 The RSO or duly authorized representative shall identify and schedule routine surveys as required by the radiological conditions and work activities.
 - 8.6.2 Routine Survey Schedules shall be developed using a standard system for designating surveys as follows:

Frequency of Survey

•	Daily .	D
•	Weekly	W
•	Monthly	M
•	Quarterly	Q
•	Semi-Annually	S ,
•	Annually	Α
•	Upon Entry	U

Type of Survey

•	Radiation	R
•	Contamination	С
•	Area TLD	Т
•	Air Sample	Α

Example: Where:

DRC-1

D: is the survey frequency (Daily in this example)
R: is the type of survey (Radiation in this example)

- C: is a type of survey (Contamination)
- 1 corresponds to the numerical sequence of the survey
- 8.6.3 Routine survey schedules shall be submitted to and approved by the RSO or duly authorized representative.
- 8.6.4 Prepare routine survey tracking forms using the approved routine survey schedules.
- 8.6.5 Changes to any routine survey schedule shall be submitted to and approved by the RSO or duly authorized representative.
- 8.6.6 Routine Survey Schedules should be indicated on form OP-001-01or equivalent form. Task Leaders may elect alternate forms of containing, as a minimum, the information included on the OP-001-01 form.
- 8.7 Using As Low As is Reasonably Achievable (ALARA) Principles for Scheduling and Performing Surveys
 - 8.7.1 Routine surveys should not be performed in High Radiation Areas unless other work necessitates entry. Boundary verification surveys would be appropriate if an entry is not required.
 - 8.7.2 Routine surveys should be performed in conjunction with other work surveys as much as practicable.
- 8.8 Performance of Routine Surveys
 - 8.8.1 HPT's shall perform routine surveys in accordance with the applicable operational procedure.
 - 8.8.2 Upon completion of a routine survey, the HPT shall initial the appropriate Routine Survey Tracking Form.
- 8.9 Periodic Evaluation of Routine Surveys
 - 8.9.1 Routine survey schedules shall be reviewed and updated periodically to ensure that all areas within the project boundaries are receiving the appropriate routine survey coverage.
 - 8.9.2 Changes of conditions within the project area will be reported to the RSO or duly authorized representative and may require a modification of the routine radiological survey schedule.
- 8.10 Management Notification

8.10.1 The RSO shall be notified, in writing by the project manager, of any failure to complete a routine survey as scheduled. The missed survey will be completed within 24 hours of discovering the inconsistency.

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 Instruments used to perform routine radiological surveys will be inspected for serviceability each day and checked against check sources to verify they are in proper working condition per the applicable Operational Procedure.
 - 9.1.2 Radiation and Contamination surveys will be reviewed by the RSO or duly authorized representative for accuracy and completeness.

9.2 Records

- 9.2.1 At a minimum, each survey record should include the following:
 - A diagram of the area surveyed, if applicable.
 - A list of items and equipment surveyed.
 - Specific locations on the survey diagram where wipe test were taken.
 - Ambient radiation levels with appropriate units.
 - Contamination levels with appropriate units.
 - Make and model number of instruments used.
 - Background levels, if applicable.
 - Name of the person making the evaluation and recording the results and date.
- 9.2.2 Radiological Survey Records, routine survey schedules, and tracking forms are generated during the performance of this procedure.
- 9.2.3 Documented information shall be legibly written in ink.
- 9.2.4 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single

- line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.5 The health physics technician performing the survey shall ensure that this procedure is the most current and approved revision.
- 9.2.6 The health physics technician performing the survey shall review Forms and any other applicable forms for accuracy and completeness.
- 9.2.7 Entries on Forms and any other pertinent forms must be dated and initialed by the health physics technician performing the survey to be valid.
- 9.2.8 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

• OP-001-01

Routine Survey Schedule

• OP-001-02

Survey Form

OP-001-01 ROUTINE SURVEY SCHEDULE

Survey Designation	Location of Survey					
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OP-001-02 Radiological Survey Sheet

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1.0 PURPOSE

This procedure describes methods for control of instrument check sources and the methods used to evaluate sources for the potential of leaking radioactive material. These sources are used to ensure proper radiation detection instrument operation. Adherence to this procedure will provide reasonable assurance that personnel exposures will be below specified limits, sources will not be lost or misplaced, personnel will remain free of contamination, and contamination will not be spread beyond any designated contaminated areas. In addition, adherence to this procedure will provide reasonable assurance that leak testing of radioactive sources meet the requirements of 10 CFR 20 and NRC license.

2.0 APPLICABILITY

This procedure will be used by Cabrera Services, Inc. (CABRERA) personnel for use and control of radioactive check sources used for portable radiation detectors. This procedure will also be used for leak testing of radioactive sources and also applies to licensed and exempt sources.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

3.1 Precautions

- 3.1.1 When performing a leak test on non-exempt quantity sources, use specific license procedures.
- 3.1.2 If non-exempt quantity sources are used, the RSO or duly authorized representative will determine any additional precautions (i.e., finger rings, etc.).
- 3.1.3 If licensed quantity sources are leak tested, the RSO or duly authorized representative will determine any additional precautions (i.e., finger rings, etc.).
- 3.1.4 The window area of a particle detector is covered with a thin window and may be easily punctured. Avoid surveying areas which have protruding fragments that may puncture the detector face. Remove the protruding fragments, if possible, before surveying. Upon removal of the leak test sample, monitor the sample away from the source. If the sample yields a high-count rate compared to background, assume the source to be leaking and estimate the activity based upon the reading of the portable instrument.

3.2 Limitations

- 3.2.1 Storage location(s) of instrument check sources will be approved by the RSO or duly authorized representative for protection against loss, leakage, or dispersion by the effect of fire or water.
- 3.2.2 A Radiation Work Permit must be generated for leak testing of non-exempt sources.

3.3 Requirements

- 3.3.1 Individual source quantities shall not exceed exempt quantity limits without permission of the RSO or duly authorized representative.
- 3.3.2 The methods specified in this procedure will be audited annually to ensure compliance with the requirements to control radioactive sources.
- 3.3.3 The results of leak test samples shall be stated as less than 0.005 microcuries of removable activity if applicable in order to comply with NRC requirements.
- 3.3.4 Ensure accountability and direct control of the source at all times when it is unlocked. Minimize the number of people in the area of the source during the leak test to reduce exposure and maintain work areas as low as is reasonably achievable (ALARA). If high radiation area controls are necessary, the source must either be locked or guarded.
- 3.3.5 Only qualified Health Physics personnel may use or have possession of CABRERA radioactive check sources.

4.0 REFERENCES

•	OP-001	Radiological Surveys
•	OP-020	Operation of Contamination Survey Meters
•	OP-021	Alpha-Beta Sample Counting Instrumentation
•	OP-022	Operation of Ionization Chambers
•	OP-023	Operation of Micro-R Survey Meters
•	NUREG-1556	Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

5.1 Restricted Area – An area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.

5.2 Leak Test – A survey technique used to determine the presence of removable activity from the surface of a sealed source.

6.0 EQUIPMENT

- Ludlum 2929 or equivalent
- Smears
- Portable radiation detection equipment
- Calibration sources

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) The PM is responsible for ensuring that all personnel assigned the tasks of control and leak testing of sealed sources of radioactive material, are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained with radioactive sources as described in this procedure. The RSO ensures the Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT are responsible for control and use of radioactive check sources. The HPT conducting leak tests of sealed sources are responsible to comply with the provisions of this procedure.

8.0 INSTRUCTIONS

- 8.1 Action Levels
 - Inventory

The RSO or duly authorized representative shall be notified immediately if it has been determined that a source is missing and an immediate search shall be conducted.

Leakage

If a source is suspected to have lost integrity, the RSO or duly authorized representative shall be notified immediately and a leak test shall be performed.

Radiation Levels

Radiation levels shall be maintained at less than 2 millirem per hour on any accessible surface where the radioactive check sources are stored. Notify the RSO or duly authorized representative if radiation levels exceed 2 millirem per hour.

8.2 Inventory

A physical inventory of all instrument check sources will be conducted by the RSO or duly authorized representative at least once each quarter and whenever a new check source is received or an old check source is disposed. The results shall be recorded on Form OP-009-01 and shall be retained in the source file for a period of not less than three years.

8.3 Initial Preparations

- 8.3.1 Select a work area to conduct the leak test that is free of radioactive contamination.
- 8.3.2 Select instruments that are capable of detecting at least 0.005 microcuries of the radionuclide of concern.
- 8.3.3 Inform the RSO or duly authorized representative of the source to be leak tested. The RSO or duly authorized representative will evaluate the test and provide precautionary measures to ensure protection of people and equipment in the work area.
- 8.3.4 Smear the outside surface of the source using cloth or paper. This smear will be the leak test sample that is analyzed for activity associated with a potentially leaking source.
- 8.3.5 Be cautious when handling leak test samples to prevent the spread of contamination, should the sample have loose radioactivity on it from a leaking source.
- 8.3.6 If the source emits particle radiation, a very thin window will typically cover the radioactive material. Take special precautions to prevent damage to the window during leak testing.
- 8.3.7 Be sure to wear rubber or latex gloves when handling the leak test samples or equipment associated with the test.

8.4 Analysis

The leak test sample shall be analyzed by a method, which will ensure detection of at least 0.005 microcuries of the radionuclide of interest. Existing CABRERA procedures shall be used as practical to ensure appropriate analysis and documentation of results.

Note:

If the activity estimation determines the leak test sample to be in excess of the leak test limit of 0.005 microcuries, then label the source as unusable to prevent further spread of activity. Conduct a detailed survey of the leak test work area to ensure that activity from the source has not spread beyond the capsule of the source.

8.5 Performing a Leak Test

- 8.5.1 Although leak tests are not required for exempt quantity sealed sources, in the event a source is suspected of having a loss of encapsulation or other possible leakage, the following procedure shall be followed, under the direction of the RSO or duly authorized representative:
 - 8.5.1.1 A visual inspection of the source shall be made for physical damage. If an area of the source is noticeably damaged, perform the leak test in that area, otherwise proceed to step 8.3.1.2.
 - 8.5.1.2 Determine the extent of source leakage by one of the following methods:
 - 8.5.1.3 Dry Wipe Test This test will be performed on encapsulated sources or adjacent surfaces of plated or foil sources. The sources shall be wiped with a dry disc smear applying moderate pressure. Removal of any radioactive materials from the source or adjacent surfaces (i.e., source leakage) will be determined by counting the filter paper with appropriate instrumentation.
 - 8.5.1.4 Wet Wipe Test This test will be performed on encapsulated sources only. The entire surface of the source shall be wiped with a disc smear moistened with water, applying moderate pressure. Removal of any radioactive material from the source will be determined by counting the filter paper with appropriate instrumentation after the filter paper has dried out.
- 8.5.2 When any contamination or leak test reveals the presence of 0.005 μ Ci or greater of removable contamination, or activity removed is above the critical level of the detecting instrument, the source shall be retested. The source will be either repaired, if possible, or

disposed of as radioactive waste if the second test is unsatisfactory. The results of leak tests for the sources are recorded on Form OP-009-02 and shall be retained for a minimum of three years.

8.6 Survey

The on-contact radiation level exterior to where the sources are stored shall be maintained at less than 2 millirem per hour on any accessible surface. A radiation survey of the storage location shall be performed at least quarterly and after the receipt of any additional check sources.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 The quality of leak test analyses is dependent upon the quality of the wipe, and the quality of analysis. Periodic evaluation of the process and analysis methods shall be conducted to ensure appropriate methods are used and this procedure is followed.

9.2 Records

- 9.2.1 The RSO or duly authorized representative prepares and maintains a source file which shall, at a minimum, consist of the following:
 - Procurement history of each source, including copies of seller certification;
 - Status change damage, sale or transfer, disposal, or recalibration:
 - · Completed "Sealed Source Inventory and Leak Test" Form; and,
 - Any other correspondence related to the sources.
- 9.2.2 Documented information shall be legibly written in ink.
- 9.2.3 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.4 The health physics technician using this procedure shall ensure that it is the most current and approved revision.
- 9.2.5 The health physics technician performing inventory shall review Forms OP-009-01 and OP-009-02 for accuracy and completeness.
- 9.2.6 Entries on Forms OP-009-01 and OP-009-02 and any other pertinent forms must be dated and initialed by the health physics technician performing the inventory to be valid.

9.2.7 The RSO or duly authorized representative shall review completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-009-01 Sealed Source Inventory and Leak Test

OP-009-02 Sealed Source Leak Test Data Sheet

OP-009-01 SEALED SOURCE INVENTORY AND LEAK TEST

Inventory Period:	First Quarte	er Secon	d Quarter	Third Quarter 🔲	Fourth Quart	ter 🗌	
Isotope	Source (Type/Form)	Serial Number	Location	Initial Activity	Corrected Activity	Leak Test uCi/smear	
	· .						
						·	
·							1
							1
				·			1
							1
							1
Comments							· · · · · · · · · · · · · · · · · · ·
Date Performed:_		By:	-	Print/Sign	····		
Reviewed/Approv	ed By:					Date:	
			Print/Sign				
OP-009-01		· · · · · · · · · · · · · · · · · · ·	Cabrera Servi	ces, Inc.			Page 8 of 9

OP-009-02 Sealed Source Leak Test Data Sheet

Source Information	Source ID Number	· · · · · · · · · · · · · · · · · · ·				
Source Manufacturer:	Date of Assay:	•				
Source Model Number:	Source Serial #					
Activity of Source at Assay Date:Ci	Source Today:	Ci				
Radionuclide name: Half-life of radionuclide						
Leak Test Sample Information						
Location of Leak Test Work Area						
Describe the method of leak testing:		, .				
Sample Geometry:	Detector:					
Detection Efficiency:c/d	Background count time:	min,				
Background count rate:cpm	Background count rate:cpm MDA: microcuries					
Sample net count rate:cpm	Sample count time:	min.				
Leak test sample activity: microcuries						
Leak Test Result - Check all boxes that app	ly					
The leak test sample is in excess of the 0	0.005 microcurie limit					
The leak test sample is below the 0.005 microcurie limit						
The source has been controlled to prevent the spread of activity from the shield.						
Source Leak Test Performed by: Date:						
Leak Test Analysis Conducted by: Date:						
Radiation Safety Officer: Date:						

1.0 PURPOSE

The purpose of this procedure is to specify requirements for releasing material from controlled areas and to minimize the potential for unintentionally releasing contaminated items to uncontrolled areas in accordance with the provisions stated in Section 4.0, References. This procedure sets forth the specific requirements for release of materials from controlled areas applicable to Cabrera Services, Inc. (CABRERA) field projects.

2.0 APPLICABILITY

- 2.1 This procedure provides instructions for CABRERA personnel while performing release surveys of items controlled as contaminated or potentially contaminated with radioactive materials.
- 2.2 The procedure will be used to ensure by survey that materials released from contaminated or potentially contaminated areas will meet the release criteria applicable to the license conditions, St. Albans VAECC facility requirements, or as specified in regulations or guidance provided by applicable regulatory agencies of the federal or state government.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

- 3.1.1 Instruments used to perform release surveys shall be operated in accordance with the respective operating procedure.
- 3.1.2 Large area smears may be used to augment (but not replace) the 100 cm² smear survey. Large area wipes may be counted with the Ludlum Model-3 or equivalent. Large area smears are used to obtain immediate information concerning loose contamination for the purpose of radiological protection and to minimize time spent performing disc smears on an item easily identified as contaminated.
- 3.1.3 A release document package, at a minimum, shall include the following forms:
 - 3.1.3.1 The Health Physics daily log.
 - 3.1.3.2 Material Release Log.
 - 3.1.3.3 Radiation and Contamination Survey or an Unconditional Release of Equipment or Items Survey and/or Sample Calculation Worksheet.

- 3.1.3.4 Daily Instrument Calibration Log.
- 3.1.4 The release document shall include the following information:
 - 3.1.4.1 The date of the release survey.
 - 3.1.4.2 The number of the release survey.
 - 3.1.4.3 A description or identification of the item.
 - 3.1.4.4 The identity of the Health Physics Technician performing the release survey.
 - 3.1.4.5 The evaluator of the material for release.
 - 3.1.4.6 The release approval of the RSO or duly authorized representative.
- 3.1.5 Surveys performed for the release of material shall be documented on a Radiation and Contamination Survey and/or on an Unconditional Release of Equipment or Items Survey.
- 3.1.6 Radiation/contamination surveys shall be performed in accordance with OP-001.
- 3.1.7 Items identified as radioactive during the release survey shall be controlled in accordance with OP-019.
- 3.1.8 Personnel performing release surveys shall be logged in on a Radiation Work Permit in accordance with AP-012 (if applicable).
- 3.1.9 Audible response instruments must be used during direct scan surveys.
- 3.1.10 The instruments used for release surveys shall be within current calibration and shall have had a response check performed daily or before use in accordance with the instrument's operating procedure.
- 3.1.11 Items presented for release shall be direct scanned in an area of low background.

3.2 Limitations

3.2.1 The maximum probe speed during direct scan surveys of surfaces shall be 3 cm/sec.

- 3.2.2 A response check shall be performed at the completion of the workday for instruments used for direct scan surveys in accordance with the instruments operating procedure.
- 3.2.3 The probe face shall be held within ¼ inch of the surface being surveyed for alpha radiation, and within ½ inch of the surface being surveyed for beta-gamma radiation.
- 3.2.4 If an instrument used to perform release surveys fails any operational check, it shall be removed from service. All data collected during the period of instrument failure must be evaluated by the RSO or duly authorized representative.
- 3.2.5 Posting and access control of controlled areas shall be performed in accordance with OP-019.

3.3 Requirements

None

4.0 REFERENCES

• 10 CFR 20	Standards for Protection Against Radiation
 AP-012 	Radiation Work Permits
• OP-001	Radiological Surveys
• OP-009	Use and Control of Radioactive Check Sources
 OP-019 	Radiological Posting
 OP-020 	Operation of Contamination Survey Meters
 OP-021 	Alpha-Beta Counting Instrumentation
• OP-023	Operation of Micro-R Survey Meters
 NUREG-1556 	Consolidated Guidance About Material Licenses (Vol.11)
 Reg 1.86 	Termination of Operating Licenses for Nuclear Reactors

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Activity The rate of disintegration (transformation) or decay of radioactive material. The units of activity for the purpose of this procedure are Becquerel (Bq) or micro-Curies (μCi).
- 5.2 Contamination Deposition of radioactive material in any place where it is not desired. Contamination may be due to the presence of alpha particle, beta particle or gamma ray emitting radionuclides.
- 5.3 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.

- 5.4 Fixed Contamination Radioactive contamination that is not readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk smear, or masslinn.
- 5.5 Minimum Detectable Activity (MDA) For purposes of this procedure, MDA for removable radioactive contamination is defined as the smallest amount of sample activity that will yield a net count with a 95% confidence level based upon the background count rate of the counting instrument used.
- 5.6 Release for Unconditional Use A level of radioactive material below which it is acceptable for use without restrictions. Under normal circumstances, authorized limits for residual radioactive material are set equal to, or below, the values specified in Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors.
- 5.7 Survey is defined as an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.
- 5.8 Survey Exempt Materials The contents of sealed containers which remain unopened while in a controlled area are exempt, the outside surfaces are not exempt.

6.0 EQUIPMENT

None

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of surveying materials are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of contamination survey meters described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT are responsible for performing the surveys described in this procedure.

8.0 INSTRUCTIONS

8.1 Release Limits for Gross Activity (Unknown Isotopes)

EMISSION	REMOVABLE	TOTAL (Fixed and Removable
	dpm/100 cm ²	dpm/100 cm ²
Beta-Gamma	200	1000

NOTE:

If all of the constituents of the contamination are known and documented on the release documents, the release limits of Table 1 of Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors applies.

- 8.2 Inaccessible Surfaces
 - 8.2.1 Items with inaccessible surfaces should be disassembled as completely as possible to facilitate release surveys. Items with inaccessible surfaces will not be unconditionally released unless evaluated by a designated evaluator who authorizes and documents the release.
 - 8.2.2 The following guidance will be used when performing evaluations:
 - 8.2.2.1 A history of the item should be reviewed.
 - 8.2.2.2 The actual release survey shall be reviewed.
 - 8.2.2.3 Determination of the radiological conditions in the area the item has been used or stored shall be reviewed.
- Materials considered dangerous, fragile, or not readily smearable due to their physical or chemical nature shall not be unconditionally released unless evaluated on a case by case basis for release in a manner consistent with Section 8.2.2. Evaluation for release shall be performed by a designated evaluator only.
- 8.4 Survey Exempt Materials
 - 8.4.1 Items such as briefcases, pens, papers, personal clothing, etc., are exempt from the Health Physics release survey requirements of this procedure, unless deemed appropriate by the HPT.
 - 8.4.2 Individuals shall survey the exempt items in the same manner as a whole body frisk when leaving a controlled area or have a Health Physics Technician perform the survey.
- 8.5 Survey Procedure

- 8.5.1 Upon receipt of an item presented for release, attempt to determine the history:
 - 8.5.1.1 Purpose of item.
 - 8.5.1.2 The current and past use of the item.
 - 8.5.1.3 The location(s) in which the item was used or stored.
 - 8.5.1.4 If the item was ever used for work with radioactive material or used in an area where radioactive material was used or stored.

NOTE:

This knowledge of the item history should provide the surveyor with information helpful in performing the release survey.

- 8.5.2 Using protective clothing such as gloves, perform large area smears of 100% of the accessible surfaces of the item using large area wipes (e.g. masslinn).
 - 8.5.2.1 Determine if transferable (loose) radioactive material is present by measuring the amount of activity on the surface of the cloth.
 - 8.5.2.2 If the presence of radioactive material is indicated by a count rate above background, the item shall be treated as contaminated until the results of the disc smear survey are obtained and determination is made concerning the actual 100 cm² loose contamination levels. The material shall be controlled in accordance with OP-019.
- 8.5.3 Perform a direct scan of 100% of all accessible areas of the item, in accordance with the instrument's operating procedure, and OP-001.

NOTE:

Items presented for release shall be direct scanned in an area of low background. Preferably \leq 100 CPM. The Health Physics Technician performing the release survey shall determine if the background is acceptable for direct scan of the item.

- 8.5.4 If the scan indicates radioactive material on the surface of the item is less than the limits of release for total activity, proceed to 8.5.10.
- 8.5.5 If the scan indicates radioactive material on the surface is greater than regulatory limits for total activity, the item cannot be released.
- 8.5.6 During the direct scan of the accessible surfaces of the item, a static measurement shall be taken:
 - 8.5.6.1 If an increase in the audible count rate is detected.

- 8.5.6.2 After each minute of scanning.
- 8.5.6.3 When the Health Physics Technician determines that an indication of fixed activity in an area less than ten square centimeters may be present.
- 8.5.6.4 During the static measurement, the meter probe shall be held at the proper distance from the surface being surveyed for the proper response period to allow the meter reading to stabilize, in accordance with the instrument's operating procedure.
- 8.5.7 Perform disc smears which are representative of 100% of the effective surface area.
 - 8.5.7.1 100% of the effective accessible surface means performing a 100 cm² disc smear on all accessible areas of the item suspected of being contaminated.
- 8.5.8 Count the smears in accordance with reference OP-001 and/or OP-021 as appropriate.
 - 8.5.8.1 Record smear data on the Radiation and Contamination Survey.
 - 8.5.8.2 If the smear results indicate transferable activity below the release limits, proceed to Step 8.5.10
 - 8.5.8.3 If the smear results indicated transferable activity above the release limits, the item cannot be released
- 8.5.9 If item has internal or inaccessible surfaces, CABRERA personnel will disassemble the item and repeat Steps 8.5.2 through 8.5.5 or have the item evaluated for release by a designated evaluator.
- 8.5.10 If the item meets the release limits or is evaluated as meeting the unconditional release criteria complete form OP-004-01. The RSO or duly authorized representative must review the release documents and approve the release before allowing the item to leave the controlled area.
- 8.5.11 If items are identified as radioactive during the release survey, contact the RSO or duly authorized representative.
- 8.6 Action level

- 8.6.1 If direct frisk beta-gamma instrument readings exceed 100 cpm above background (with background less than 200 cpm) those areas shall be surveyed as follows:
 - 8.6.1.1 Perform a smearable contamination survey using 100 cm² of affected areas, and count the smears for beta-gamma contamination to determine if contamination is "fixed" or "removable."
- 8.6.2 Dose rate surveys, which exceed 0.2 mR/hr, shall be brought to the attention of the RSO or duly authorized representative for release or acceptance approval.
- 8.7 The results of the survey shall be documented on Radiation and Contamination surveys.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

- 9.1.1 Instrumentation used for surveys will be checked with standards each day prior to use and verified to have current valid calibration.
- 9.1.2 When releasing a large volume of materials, a program may be established under the discretion of the RSO or duly authorized representative to ensure by second check that no radioactive material has been released to the public or the environment.
- 9.1.3 The health physics technician performing the survey shall review Form OP-004-01 and any other applicable forms for accuracy and completeness.

9.2 Records

- 9.2.1 Documented information shall be legibly written in ink.
- 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.3 The health physics technician performing the survey shall ensure that this procedure is the most current and approved revision.
- 9.2.4 Entries on Form OP-004-01 and any other pertinent forms must be dated and initialed by the health physics technician performing the survey to be valid.

9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-004-01

Unconditional Release of Equipment or Items Report

OP-004-01 UNCONDITIONAL RELEASE OF EQUIPMENT AND ITEMS LOG

tem/	Comments	Survey #	Date
Equipment Released			
		 	
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viewed RA:		Date:	
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1.0 PURPOSE

This procedure instructs Cabrera Services Inc. (CABRERA) field personnel in the proper use of step-off pads.

This procedure provides the method Cabrera Services, Inc. (Cabrera) uses to ensure step off pads are used in accordance with procedure requirements. Adherence to this procedure will provide reasonable assurance that step-off pads are being used to prevent the spread of contamination. Adherence to this procedure also provides adequate control of contamination levels which meets CABRERA's goal of maintaining radiation exposures As Low As is Reasonably Achievable (ALARA).

2.0 APPLICABILITY

This procedure applies to all CABRERA radiological remediation projects or operations that use step-off pads for radiological contamination control.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

Step-Off pads should always be placed in the Radiological Buffer Area just outside the contamination area as a control to prevent the spread of contamination.

3.2 Limitations and Requirements

Not Applicable

4.0 REFERENCES

HASP

 OP-001
 OP-004

 Health and Safety Plan (Radiation Safety Program)

 Radiological Surveys
 Unconditional Release of Material from Radiological Control Areas

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.
- 5.2 Contamination Survey A survey technique to determine fixed and removable radioactive contamination on components and facilities.

- 5.3 Radiation Survey is defined as an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.
- 5.4 ALARA (acronym for "as low as is reasonably achievable") An approach to radiation exposure control to maintain personnel radiation exposures as far below the federal limit as technical, economical and practical considerations permit.

6.0 EQUIPMENT

Step-Off Pads

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) The PM is responsible for ensuring that all personnel assigned the task of utilizing step-off pads are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation Safety Officer (RSO) The Radiation Safety Officer is responsible for monitoring compliance with this procedure and training personnel in the use of step-off pads.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT performing radiological surveys in accordance with this procedure are responsible for knowing and complying with this procedure.

8.0 INSTRUCTION

- 8.1 Location of Step-Off Pads
 - 8.1.1 Radiation safety personnel will specify the placement of step-off pads based on the requirements listed below:
 - A single step-off pad should be installed at exit points from areas where loose surface contamination levels exceed 200 dpm/100 cm² for β, γ.
 - Two step-off pads, separated by a covered area where possible, should be installed at exit points from areas where contamination

levels exceed one hundred times the limits for a single step-off pad.

- 8.1.2 Considerations must be given to other radiological conditions and general safety precautions when installing step-off pads:
 - Step-off pads should be positioned at personnel control points in such a manner that they do not cause individuals to remain in significant radiation fields while removing protective clothing. In these cases, the step-off pad should be separated from the actual point of exit, by a covered area.
 - Step-off pads should be placed in such a manner that they do not constitute a safety hazard. For example, step-off pads should not be placed on steep ground, slippery surfaces, etc.
 - Step-off pads should not be placed at Emergency Exits or at an Equipment Exit or Entrance.

8.2 Use of Step-Off Pads

- 8.2.1 Step off pads shall be considered uncontaminated surfaces in the case of a single step-off pad; or as surfaces of lower contamination than the contaminated area, in the case of first two step-off pads (when exiting the posted area). The step-off pad needs to be surveyed periodically in accordance OP-001.
- 8.2.2 Before stepping out of the Contaminated Area or Airborne Radioactivity Area to the step-off pad, the worker should:
 - · Remove exposed tape.
 - Remove rubber overshoes.
 - Remove outer pair of gloves.
 - Remove hood from the rear.
 - Remove respiratory protection as applicable.
 - Remove coveralls, inside out, touching the insides only.
 - Take down barrier closure, as applicable.
 - Remove tape or fastener from inner shoe cover.
 - Remove each shoe cover, place the shoe cover into the

container for contaminated shoes, and step onto clean step-off pad.

- Remove cloth glove liners.
- Replace barrier closure, as applicable.
- Commence whole body frisking.
- Frisk badge and dosimeter.
- 8.2.3 The sequence for the removal of primary and supplemental dosimetry is dependent upon where the dosimetry was worn and the potential for contamination.
- 8.2.4 Use of Multiple Step-Off Pads
 - Multiple step-off pads should be used to control exit from high surface contamination areas. These pads define interim control measures within the posted area to limit the spread of contamination. The following controls apply:
 - The inner step-off should be located immediately outside of the highly contaminated work area, but still within the posted area.
 - The worker should remove highly contaminated outer clothing prior to stepping on the inner step-off pad.
 - Additional secondary step-off pads, still within the posted area, may be used as necessary to restrict the spread of contamination out of the immediate area.
 - The final or outer step-off pad should be located immediately outside the contamination area.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

None

9.2 Records

- 9.2.1 All records generated by this procedure are used in the Radiation Protection Program to document contamination levels of work areas and materials onsite.
- 9.2.2 Radiological survey records, routine survey schedules, and tracking forms are generated during the performance of this procedure.
- 9.2.3 Documented information shall be legibly written in ink.
- 9.2.4 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.5 The health physics technician performing the survey shall ensure that this procedure is the most current and approved revision.
- 9.2.6 The health physics technician performing the survey shall review any applicable forms for accuracy and completeness.
- 9.2.7 Entries on forms and any other pertinent documents must be dated and initialed by the health physics technician performing the survey to be valid.
- 9.2.8 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

None

1.0 PURPOSE

- 1.1 This procedure establishes the Cabrera Services Inc., (CABRERA) Training Program that, upon satisfactory completion, will allow individuals to enter and perform work with US NRC licensed radioactive material.
- 1.2 Adherence to this procedure along with site specific guidance will provide reasonable assurance that personnel will be aware of their surroundings, the hazards associated with the type of material in the work area, and the type of work conducted.

2.0 APPLICABILITY

2.1 This procedure will be used for all CABRERA project work involving licensed radioactive materials.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

3.1.1 No individual shall be allowed to work with licensed radioactive materials without training qualification and documentation under this program.

3.2 Limitations

3.2.1 Any person successfully completing this program shall be qualified for a period of one year. Annual refresher training is required to maintain training qualifications.

3.3 Requirements

3.3.1 Records of training shall be maintained. Documentation of previous training for which credit is being given shall include: individual's name, date of training, topics covered, and name of the certifying individual.

- 3.3.2 The training program for employees and contractors, requiring access to licensed radioactive material shall ensure, at a minimum, that the following regulatory requirements are met:
 - 3.3.2.1 10 CFR Part 19.12 States the training requirements for workers who in the course of employment are likely to receive in a year an occupational dose in excess of 100 mrem (1 mSv):

At a minimum, 4 hours of Radiation Safety Training will be required for subcontracted personnel and any worker meeting the condition stated in CFR 19.12(a). This 4 hour training shall cover the topics required in CFR 19.12 (a)(1) through (a)(6), as well as any pertinent information in 10 CFR parts 19 and 20 and the Site's NRC license and standard operating procedures. It is mandatory that any females participating in this program receive specific training on prenatal radiation exposure (Reference 4.). An annual refresher course in Radiation Safety will also be required, and as be such provided and documented.

3.3.2.2 29 CFR 1910.120 - Contains the minimum training requirements for hazardous waste operations and emergency response personnel, supervisors, and management:

All workers shall be required to possess, and provide documentation of, a current 40-hour EPA Hazardous Waste Operations and Emergency Response (HAZWOPER) Training Certificate. In addition, site specific HAZWOPER training shall be performed to complete the requirements of 29 CFR 1910.120. The site specific HAZWOPER training shall also cover the content of the Emergency Plan, and provide detailed instruction on response to site emergency events.

- 3.3.3 Individuals performing a specific limited task, or requiring access for observation or similar purposes, shall be exempt from the requirements in Section 3.3.2, and may be allowed on-site if the following requirements are met:
 - 3.3.3.1 Prior to entry, the individual shall have, or be given, the appropriate radiation, hazardous operations, right to know, and other site specific information necessary for the radiological and other hazardous conditions expected to be encountered.
 - 3.3.3.2 The individual shall have approval of the RSO or duly authorized representative to enter the site. The RSO or duly authorized representative shall document this approval by co-signing the individuals entry in the site access log.
 - 3.3.3.3 Such persons shall also have a continuous escort by, or be within continuous view of, a fully trained site representative (e.g. RSO, RFS, HPT).

4.0 REFERENCES

•	NRC Regulatory Guide 8.29	"Instruction Concerning Risks From Occupational Radiation Exposure"
•	Draft Regulatory Guide DG-8012	"Instruction Concerning Risks From Occupational Radiation Exposure" 12/94
•	NRC Regulatory Guide 8.13	"Instruction Concerning Prenatal Radiation Exposure"
•	INPO 93-009	Guidelines for General Employee Training
•	RSP	Radiation Safety Program
•	RSTM	Radiation Safety Training Manual
•	10 CFR Part 19	Code of Federal Regulations
•	10 CFR Part 20	Code of Federal Regulations

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Procedure A logical, concise document describing the general requirements and methods to be used regarding a specific topic.
- 5.2 Training The transfer of information by instruction to ensure knowledgeable personnel.

6.0 EQUIPMENT

None Required

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) The PM is responsible for ensuring that personnel assigned the task of training are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in implementing actions described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. The RFS is responsible for identifying training needs. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) Health Physics Technicians are responsible for radiation and general safety protection and counseling workers in the proper way to protect themselves. The HPT performing requirements of this procedure is responsible for knowing and complying with this procedure.
- 7.5 All Other Personnel All CABRERA personnel are responsible to ensure their training needs are met to ensure safe and efficient completion of projects.

8.0 INSTRUCTIONS

8.1 This program is designed to include approximately 4 hours of classroom instruction, practical training as necessary, and three hours to complete a 50 question multiple choice exam (see Attachment B). Each individual will be required to achieve, at a minimum, a passing score of 80%. Any individual that scores below 80% but greater than 65% will be allowed to take the test over after completing the 4 hour course. Additional site-specific HAZWOPER training will also be required as necessary. The course instructor should use training aids, which include, but not be limited to slides, handouts, instruments, etc. to increase trainee understanding of the material being presented.

Note:

It is mandatory that any females that are participating in this program and/or allowed access to a licensed site receive specific training on prenatal radiation exposure (see Section 4.0).

- 8.2 Four Hour Radiation Worker Training
 - 8.2.1 Attachment 1 is an outline of topics to be covered in the 4 hour radiation worker training. This outline shall serve as a general curriculum for instructors.
- 8.3 HAZWOPER Site Specific Training
 - 8.3.1 The required 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training shall be supplemented with any site specific information which is required by 29 CFR 1910.120, and is pertinent to worker safety at the licensed site. At a minimum, the following information shall be covered:
 - Names of personnel and alternates responsible for site safety and health;
 - Safety, health and other hazards present on site;
 - Site Emergency Response Plan;
 - Use of site-specific personal protective equipment;
 - Work practices by which the employee can minimize risks from hazards;
 - Safe use of engineering controls and equipment on-site

- Medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards;
- · Site decontamination procedures; and
- Confined space entry procedures.
- 8.4 Procedures for operation of instruments, methods of job completion, information important to emergency response, and methods of personnel protection will be discussed with all personnel prior to their job assignments which involve these activities.
- 8.5 An individual training record shall be maintained for each individual assigned to work at CABRERA work sites.
- 8.6 A course attendance record shall be prepared by the instructor for each class given.
- 8.7 A review of personnel qualifications shall be completed by the individual and reviewed by the project manager for each individual hired to perform a specific job function at the project site.
- 8.8 On-The-Job training is as important as other types of training and should be documented when it occurs. An instructor shall validate on-the-job training as it occurs. The project manager may provide this validation in the absence of an instructor.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 Each individual will be required to achieve at a minimum a passing score of 80%. Any individual that scores below 80% but greater than 65% will be allowed to take the test over after completing the 4 hour course. Additional site-specific HAZWOPER training will also be required as necessary. The course instructor should use training aids, which include, but not be limited to slides, handouts, instruments, etc. to increase trainee understanding of the material being presented.

9.2 Records

- 9.2.1 Documented information shall be legibly written in ink.
- 9.2.2 Data shall not be obliterated by erasing or using white-out. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.

- 9.2.3 The RSO or duly authorized representative shall ensure that the Training procedure is the most current revision number.
- 9.2.4 The RSO or duly authorized representative shall review the Training examination for accuracy and completeness.
- 9.2.5 Student taking the exam must date and sign the exam for it to be valid.
- 9.2.6 The exam shall be kept in the students file folder by the RSO at the site office. The RSO's file cabinet shall be kept locked when unattended.

10.0 ATTACHMENTS

Attachment 1

Radiation Worker Training Instructor Outline

Attachment 2

Guideline for Examination

Attachment 1

Radiation Worker Training Instructor Outline

INSTRUCTORS OUTLINE

A. INTRODUCTION

1. Goal

Upon successful completion of this program, the individual shall have sufficient understanding of licensed Site procedures and basic principles of radiation protection.

2. Health Physics

- a. State the purpose of Health Physics "To protect people and their environment from the harmful effects of ionizing radiation"
- b. Present a description of the Health Physics Department including the basic responsibilities of:
 - i. Radiation Safety Officer (RSO)
 - ii. Radiological Field Supervisor (RFS)
 - iii. Health Physics Technicians

3. Site history

- a. Give a brief description of the history of the Site including:
 - i. chronological history
 - ii known hazardous materials
 - iii. locations of buried materials
- 4. Scope of current activities and licensed operations
 - a. Give a brief presentation of current activities and licensed activities

involving radioactive material on the site. Present general information on the current status of accessible (above ground if any) site contamination. Describe any other hazards that workers may encounter during present and upcoming activities.

B. RADIATION PROTECTION

- 1. Atomic Structure
 - a. Atom; Describe the basic structure of the atom
 - i. Proton Relative size 1 AMU Positive (+) electrical
 charge # of protons determines element
 - ii. Neutron Relative size 1 AMU, No electrical chargeProtons & Neutrons reside in the Nucleus
 - iii. Electron Relative size 1/2000 AMU Negative (-) electrical charge Orbits Nucleus
 - b. A standard atom has equal number of protons and electrons for neutral electrical charge

c. Proton to Neutron ratio equal to 1 in lighter atoms. As atoms get heavier additional neutrons > 1/1 ratio are required for the nucleus to maintain internal balance (stable).

Example:

Hydrogen	1 Proton	0 Neutrons
Oxygen	8 Protons	8 Neutrons
Potassium	19 Protons	20 Neutrons
iron	26 Protons	30 Neutrons
Lead	82 Protons	126 Neutrons
Thorium	90 Protons	142 Neutrons

d. Isotope; Family of atoms within an element where the nuclei have the same number of protons but differing number of neutrons.

Example:

Element: Thorium, Isotopes: Th-230, Th-232

Th-230: 90 Protons 140 Neutrons

Th-232: 90 Protons 142 Neutrons

- e. Imbalance in neutron / proton ratio causes atom to be unstable i.e. RADIOACTIVE.
- f. Nature strives to be in balance, to stabilize an unbalanced atom emits radiation.

2. Radioactive Material

An unstable atom or group of atoms who in an effort to become stable emit ionizing radiation.

- a. Radioactive Contamination:
 - i. Radioactive atoms on the surface of non-radioactive material (loose or fixed)
 - ii. Radioactive material where we don't want it.
- b Nuclear Activation:
 - Material not originally radioactive, but activated by exposure to a Nuclear Reactor Core, neutron source, etc.

Example:

Co⁶⁰

- c. Naturally occurring:
 - i. Radioactive atoms occurring in nature.
- 3. Radiation

In an effort to balance N/P ratio radioactive isotopes emit ionizing radiation.

lonization - The removal of an orbiting electron from its parent atom.

There are 4 types of ionizing radiation emitted from unstable atoms. This lecture will deal only with only the 3 natural types of ionizing radiation.

a. Alpha Particles

- i. 2 protons (++) 2 neutrons, no electrons (Helium nucleus).
- ii. Emitted from nucleus of heavy isotopes.
- iii lonizes by electrical attraction of electrons (-) by protons (++) in the Alpha particle.
- iv. Moves at 1/20 the speed of light (slow by nuclear standards).
- v. lonizes very readily due to slow speed and high electrical (++) charge stopped by sheet of paper.
- vi. Hazard to body only if taken internally. Dead layer of skin protects from external sources.
- vii. Alpha radiation is greatest internal hazard of the radiation's emitted by isotopes of thorium.

b. Beta Particle

- i. Particle emitted from the nucleus of unstable isotope.
- ii Generally (-) electrical charge.
- iii Generated in the nucleus by transformation of a neutron into (+) proton and (-) Beta.
- iv. Ionizes by electrical repulsion (-) beta repels electrons.
- v. Moves 1/10 the speed of light.
- vi. Due to the smaller electrical charge than Alpha, Beta penetrates deeper into materials.

- vii. Shielded by 1/4 to 1/2 inch of most solid materials.
- viii. External hazard to skin and eyes.
- ix. Internal hazard

c. Gamma Ray

- Packet of energy, no mass (other examples light, radiant heat, radio).
- ii. No electrical charge, moves at the speed of light.
- iii Emitted in conjunction with beta radiation's.
- iv. Ionizes by other indirect methods based on energy (offer to discuss after class).
- v. Very high penetrating power due to no electrical interaction.
- vi. Major external radiation hazard with some internal hazard also.

Note: Ensure students understand difference between radiation and radioactive material.

4. Units

- a. rem The unit of measurement for reporting biological damage to humans from radiation energy absorbed in human tissue.
 - i. Generally reported in fractions of a rem or millirem.1000 millirem = 1 rem.
 - ii. Used to report total dose

iii. Used to report dose rate (2 rem/hour = 2000 mrem/hr)

Note: Ensure students have firm understanding of dose and dose rate concepts.

- b. DPM Disintegration Per Minute (Unit of activity)
 - i. A disintegration is the spontaneous emission of particles (and associated gamma rays) from an unstable nuclei.
 - ii. DPM Disintegration Per Minute

5. Measurement

- a. TLD
- i. Used to measure total external dose (Deep, Skin, Eye)
- ii. Demonstrate how worn (Whole Body, Wrist, Finger Rings)
- iii. What to do when lost or damaged.
- iv. What to do when not in use (storage).
- v. Used to determine legal external dose
- vi Used to comply with 10 CFR 19 and 20

b. Personnel Friskers

- i. Used to measure contamination.
- ii. Demonstrate instrument and show proper frisking techniques.
- iii. Show how to determine background and readings greater than background

c. Radiation Survey Meter

- i. Demonstrate general use of dose rate survey meter.
- ii. Compare dose rate reading with total dose reading from TLD.

d. Breathing Zone Air Sampler

- i. Demonstrate proper use of BZ.
- Discuss basic principles of airborne monitoring (DAC) hours.

e. Whole Body Counter / Bioassay

- i. Explain basic principles of whole body counting (Analysis of gamma rays emitted by RAM in the body).
- ii. Discuss Allowable Limit of Intake (ALI-maximum allowable amount of RAM taken inside the body in one year).
- iii. Mention other types of BIOASSAY (urine, fecal analysis).

f. Smear Survey

- Used for determining levels of loose surface contamination.
- ii. Explain units DPM/100 cm².
- iii. Demonstrate smear technique.
- iv. Loose surface contamination limits (clean):

≤20 DPM/100 cm² Alpha

≤1000 DPM/100 cm² Beta/Gamma

g. Fixed Contamination Survey

- i. Demonstrate fixed contamination survey.
- ii. Limit for fixed surface:

100 DPM/100 cm² Alpha

5000 DPM/100 cm² Beta/Gamma

Note:

Ensure that all students know that only radiation protection staff may perform radiation and contamination surveys (only exception personnel frisking of body and clothes).

6. Background Radiation

- a. Natural sources
 - i. Radon approximately 200 mrem/year (Rn²²⁰ from Th²³², Rn²²² from U²³⁸). Top 12" in 1 mile² average in USA 2000 lbs U, 6000 lbs Th
 - ii. Other than Radon approximately 100 mrem/year(Cosmic, K⁴⁰)
- b. Man made
 - i. Medical, approximately 53 mrem/yr (39mrem diagnostic x-rays, 14mrem nuclear medicine)
 - ii. Fallout < 4.0 mrem/yr (historical bomb testing)
 - iii. Nuclear fuel cycle <0.1 mrem/yr (U mining, transportation, Nuc. plants, waste disposal).

Note:

Maximum allowable public exposure from licensed operations is 100 mrem/yr.

iv. Consumer Products <10.0 mrem/yr (tobacco products, building materials, smoke detectors, drinking water, natural gas)

The average person by age 50 will have a total dose of 18 rem (18000 mrem) from all sources

The total average dose for all people is 360 mrem/year. This total is based on the total exposure for all Americans divided by population. An individuals dose is dependent on factors such as geographic location and medical history.

7. Occupational Dose

1992: 250,000 Individuals monitored for occupational exposure

125,000 no measurable exposure

125,000 average exposure of 300 mrem

8. Biological Effects

- a. Radiation effects on cells of the body.
 - i. Cell will die.
 - ii. Cell will repair it self.
 - iii. No damage.
 - iv. Cell is damaged, survives, cannot reproduce.
 - v. Cell genetic material is damaged, damage is passed on to next generation (mutation).

- b. Acute vs Chronic Exposure
 - i Acute Exposure High dose in short period.
 - ii Acute effects
 - <25 rem no readily detectable effects
 - >25 rem exposure slight changes in blood (MD)
 - >100 rem vomiting, diarrhea, loss of hair
 - 450 rem LD-50 with no medical intervention
 - 600 rem LD-100 with no medical intervention
- c. Chronic exposure Low dose over long period of time.Chronic exposure is the basis for our Radiation Program.
- d. Stochastic Damage (Cancer)
 - i. A particular cells level of cancer risk is dependent on how fast the cells reproduce themselves. "Radiosensitivity"
 - ii. Cancer Statistics, 20% of all adults will develop a fatal cancer from all possible causes.

In a group of 10,000 workers, 2000 will die from cancer. Expose this same group to 1 rem of ionizing radiation (DDE) statistically 4 additional cancers will result (2000 - 2004). For 100 rem 400 additional cancers.

iii. Relative Risk Table:

Hazard

Est. of days lost

Pack of Cigarettes/day

2370 days

20% overweight

985 days

Home accidents

95 days

1 rem lifetime exposure 1

1 day

Note: Other statistics are available in reg guide 8.29

- iv. Somatic Effects Effects that appear in the exposed individual
- v. Genetic Effects Effects that appear in the exposed individuals offspring

Note: There is no statistical evidence of genetic effects appearing in humans. Genetic effects have been observed in laboratory animals at very high doses.

- 9. Exposure Limits
 - a. External Dose Limits
 - i. Skin SDE 50 rem/Yr.
 - ii Max. Extremity 50 rem/Yr.
 - iii. Eyes LDE 15 rem/Yr (Cataracts).

b. Total Effective Dose Equivalent TEDE

Limit based on total dose to the body from external sources (Deep Dose [gamma] Equivalent) and doses to the body from internal sources.

TEDE = DDE + CEDE

CEDE = %ALI, 1 ALI = 5 rem CEDE

2000 DAC hours = 1 ALI

TEDE Limit - 5 rem/Yr. NRC

c. Declared Pregnant Woman (Dose to Embryo/Fetus)

500 mrem TEDE for duration of pregnancy.

Low limit due to high radiosensitivity of all developing cells...

- 10 Exposure Control
 - a. Basic concepts for reducing exposure.
 - i. Time
 - ii. Distance
 - iii Shielding
 - iv. Source Reduction
 - b. Radiation Work Permit (RWP)
 - i. Required for all work with RAM.
 - ii Must be modified if work scope changes.

- iii Must be authorized to work under RWP, authorized personnel must be trained.
- iv. Contact Radiation Protection to initiate or to add names to an existing RWP.
- c. ALARA As Low As is Reasonably Achievable
 - i. Discuss concept of ALARA principle.
 - ii. Management's responsibility to provide adequate work facilities and provide training.
 - iii. Health Physics responsibilities:
 - Awareness of jobs in progress
 - Perform proper surveys
 - Surveillance of work areas
 - iv. Workers responsibilities:
 - Proper knowledge of job requirements
 - Inform HP of work scope and changes
 - Follow all rules & procedures

Note:

Important to stress to all radiation workers that nobody has better control over your actions than yourself, every rad worker has final responsibility for ensuring a safe working environment.

11. Posting

Discuss standard posting procedures, include Tri-foil symbol, standard yellow & magenta colors, Rad rope and step off pads.

a. Radioactive Material

i. RAM posting indicates the presence of Radioactive
 Material within the posted area.

b. Radiation Area

i. Indicates that within the posted area radiation dose rates are greater than or equal to 5.0 mrem/hr at 30 centimeters from the radiation source or any surface that the radiation penetrates.

c. Contaminated Area.

- i. Indicates that within the posted area loose surface contamination may exist with levels in excess of 20 DPM/100 cm² α or 200 DPM/100 cm² β , γ .
- ii. Requirements for entry into a contaminated area are:
 - 1) Protective Clothing
 - 2) RWP [or HP permission].

12. MISC. Practical Information

a. RAD Waste.

The cost of waste storage for potential disposal is very high every effort shall be made to limit the generation waste.

- b. Airborne Contamination.
 - i. One potential for unnecessary radiation exposure working at a radiologically contaminated site comes from breathing contaminated air.
 - ii. Sources of airborne contamination:
 - Equipment dissemble & repair
 - Decontamination operations
 - Filing & Grinding
 - Mechanical Shock
 - Routine equipment operations
 - iii. It is very important that HP be notified anytime unplanned operations are taking place that could create an airborne situation.
- c. Pathways for internal contamination
 - i. Inhalation
 - ii. Oral ingestion
 - iii. Cuts or other skin openings

d. Protective Clothing

- i. Display and discuss standard protective clothing, to include:
 - Coveralis
 - Lab Coat
 - Hood
 - Shoe Covers
 - Gloves (plastic, latex, cloth)
 - Safety Glasses
- ii. Using a working copy of an RWP select one student to demonstrate proper dressing.
- iii. Review other types of protective clothing such as plastic (tyvek) suites, and face shield.

e. Emergencies

- i. For medical emergencies:
 - For minor illness leave the area & report to the HSA.
 - If minor cuts occur, contact HP prior to reporting to medical.

Note:

All cuts, scratches, or other skin openings must be checked by HP prior to entry into any contaminated area, or working with radioactive materials.

Note:

If major illness or injury occurs DO NOT remove the individual, if qualified perform first aid, if not get help.

The time utilized in removing an individual from a radiological control area during a medical emergency will have a much greater effect on that persons health than any negative effects of treating the individual within the radiological controlled area.

13. Workers Rights & Responsibilities

a. NRC Form 3

i. Show copy of Form 3, discuss. Give the locations found.

How to report potential violations to the NRC. Rights to obtaining exposure history. Protection from discrimination.

b. Workers responsibilities

- i. Stress to all students that they have the greatest responsibility in ensuring a safe working environment.
- ii. All persons working with RAM have a legal responsibility to comply with all RWPs, procedures, license requirements and NRC regulations.

Note: Individuals willfully violating safety requirements can be held criminally liable.

c. House Keeping

 All persons working inside any HP restricted area is responsible for general cleanliness in addition to radiological responsibilities.

14. Facilities Tour & Practical Training

- a. All persons unfamiliar with the Site shall have a tour of the work areas and a review of the following.
 - i. Entry and exit requirements including Personnel frisking.
 - Discussion of contaminated areas including:Step Off Pads Posting Waste Containers
 - iii. Protective Clothing & Dress out area
 - iv. Health Physics Office
 - v. Right to Know Information Center

ATTACHMENT 2 EXAMINATION

RADIATION WORKER QUALIFICATION EXAM

NAME .		<u>SS#</u>	
GRADE:	GRADED BY		RETRAIN DATE
I HAVE REVIEWED THIS I INCORRECTLY HAVE BE GIVEN THE OPPORTUNIT OTHER MATERIAL PRESI	EN REVIEWED BY T TY TO ASK QUESTIC	HE INSTRUCTO	R. I HAVE BEEN
	en en en en en en en en en en en en en e		
	er en en en en en en en en en en en en en		
SIGNATURE	DATE		

This exam contains 50 multiple choice questions, there is only one correct answer for each question. Circle the answer you think is correct. If you decide to change an answer put a line through and initial the answer you are changing and circle your new choice. There is a three hour time limit for this exam. GOOD LUCK

- 1. A radiation worker who has satisfactorily completed this course in radiation protection will be able to_____.
 - a. Approve Radiation Work Permits
 - b. Protect themselves from Radiation hazards they may encounter
 - c. Enter all posted areas without HP approval
 - d. All of the above
- 2. You have the primary responsibility for radiation protection.
 - a. All the time
 - b. Only when HP is not in the work area
 - c. When your supervisor puts you in charge
 - d. Never (Management responsibility)
- 3. What three primary components make up an atom?
 - a. Alpha, Beta & Gamma
 - b. Electron, Neutron & Proton
 - c. Radiation, Contamination & Ionization
 - d. Nucleus, X-Ray & Cosmic

4. An example of Radioactive Material is _____.

- a. A wrench with fixed contamination
- b. A frisker check source
- c. A smear reading 20,000 DPM/100 cm²
- d. All of the above

5. An example of a type of radiation is _____

- a. Gamma ray
- b. Isotope Thorium-232
- c. Nucleus
- d. A wrench with fixed contamination

6. Safety Glasses protect your eyes from _____

- a. Gamma radiation
- b. Radioactive Waste
- c. Beta Radiation
- d. Radon Gas

Revisi	on 0
7.	rem is the unit used to measure
	a. Loose surface contamination
	b. Radiation dose to human tissue
	c. The number of unstable atoms in one gram of soil
•	d. Levels of airborne contamination
8.	How many millirem (mrem) equals one rem?
•	
	a. 10
	b. 100
	c. 1000
	d. 100,000
9.	Your legal whole body dose (TEDE) is measured by
	a. TLDs, Bioassay, & B-Z Air Sampler
	b. Frisking

c. Health Physics survey

d. RWP

Training

10. The two types of Radiation of primary concern emitted by thorium isotopes are:

- a. Alpha & Beta
- b. Beta & Gamma
- c. Alpha & Gamma
- d. Alpha & X-Rays

11. The type of Radiation that will not penetrate a persons dead layer of skin is?

- a. Alpha
- b. Beta
- c. Gamma
- d. X-ray

12. A Breathing Zone air sampler (BZ) is used to measure_____

- a. Gamma radiation dose to the whole body
- b. Surface contamination in work areas
- c. Airborne contamination in work area
- d. All of the above

- 13. What instrument is used to measure radioactive material inside the body?
 - a. Hand held frisker
 - b. TLD
 - c. Whole body counter
 - d. Pocket dosimeter
- 14. A Smear survey is used to determine
 - a. Fixed surface contamination
 - b. Loose surface contamination
 - c. General area dose rates
 - d. Skin contamination on personnel
- 15. Who is allowed to perform smear surveys?
 - a. Only trained radiation workers
 - b. Outage services personnel
 - c. Health Physics staff
 - d. Only personnel listed on the NRC license

16. The average dose received by people in the United States from natural and man-made sources is

- a. 1-5 mr/year
- b. 10-50 mr/year
- c. 100-500 mr/year
- d. 1000-5000 mr/year

17. The highest dose from man-made sources to the general public comes from

- a. Medical industry
- b. Nuclear Power
- c. Television Sets
- d. Microwave ovens

18. Will human body cells repair themselves after radiation exposure typically received by radiation workers?

- a. Never
- b. Usually
- c. Always
- d. Unknown

- 19. The major concern for individuals receiving occupation radiation exposure is
 - a. Hair loss & Sterility
 - b. Increased possibility of developing cancer
 - c. Reduced resistance to colds & viruses
 - d. No concerns for exposures below NRC limits
- 20. Women require special training in radiation protection because
 - a. Women are more susceptible to radiation damage
 - b. A developing fetus is more susceptible to radiation damage
 - c. Women will require more time in restricted areas to perform their work
 - d. All of the above
- 21. The least risk to your health is ______
 - a. An exposure to 1 rem of whole body radiation
 - b. Home accidents
 - c. Overweight by 20%
 - d. Smoking 1 pack of cigarettes a day

- 22. Which of the following exposures has the greatest potential to effect your health?
 - a. 10 rem exposure to the whole body
 - b. 10 rem exposure to the skin of the body
 - c. 10 rem exposure to your hands & forearms
 - d. All of the above are equal risk
- 23. The NRC occupational limit for TEDE (Total Effective Dose Equivalent)?
 - a. 1.0 rem / Year
 - b. 2.5 rem / Quarter
 - c. 5.0 rem / Year
 - d. 50 rem / Year
- 24. The NRC Whole Body dose limit (TEDE) for declared pregnant females is?
 - a. 4.5 rem / Quarter
 - b. 2.5 rem during pregnancy
 - c. 500 mrem during pregnancy
 - d. Not allowed to receive exposure

Revision 0			

- 25. The concept of ALARA is to _____
 - a. Keep accurate records on personnel exposure
 - b. Spread exposure among all radiation workers
 - c. Develop methods to reduce overall exposure
 - d. Limit work with Radioactive Material to 40 hrs/week
- 26. Who has the greatest responsibility for maintaining a successful ALARA program?
 - a. Health Physics
 - b. Management
 - c. Radiation Workers
 - d. All of the above
- 27. What are the standard radiation warning colors?
 - a. Yellow & Magenta
 - b. Black & White
 - c. Red & White
 - d. Black & Magenta

Training

- 28. Body Cells that reproduce the most rapidly tend to be...
 - a. The least sensitive to Radiation.
 - b. The most sensitive to Radiation.
 - c. Sensitivity is unrelated to reproduction rate.
 - d. None of the above.
- 29. Before entering an area posted "CONTAMINATED AREA" you must:
 - a. Obtain an RWP
 - b. Put on Lab Coat & Gloves
 - c. Notify your supervisor
 - d. No requirements for contaminated areas
- 30. On a radiologically contaminated site, a significant potential for radiation exposure comes from?
 - a. Breathing Radioactive Material
 - b. Wearing contaminated protective clothing
 - c. Instrument check sources
 - d. TV monitors

- 31. A standard method of reducing your potential exposure to radiation is?
 - a. Covering the site with plastic sheeting
 - b. Using protective clothing for all jobs
 - c. Building shielding around all sources
 - d. Time, distance, and shielding
- 32. Step off pads are considered to be ...
 - a. Activated
 - b. Clean
 - c. Contaminated
 - d. Useless
- 33. The TEDE (Total Effective Dose Equivalent) is the sum of.
 - a. Deep Dose + Skin Dose
 - b. Deep Dose + Internal Dose
 - c. Deep Dose + Eye Dose
 - d. Skin Dose + Internal Dose

34. The unit that applies to surface contamination is..

- a. rem
- b. mR/hr
- c. DPM/100 cm²
- d. DAC hour

35. The <u>unit</u> that applies to airborne exposure is..

- a. rem
- b. mR/hr
- c. DPM/100 cm²
- d. DAC hour

36. If your supervisor tells you to add your name to an RWP and help complete a job for a co-worker, you should _____.

- a. Add your name and follow all instructions on the RWP
- b. Sign into the work area using your co-workers name
- c. Tell your supervisor he must add your name to the RWP
- d. Contact Health Physics to add your name

- 37. While working inside a contaminated area you get a small tear in the sleeve of your coveralls you should ______.
 - a. Put tape over the tear and continue working
 - b. Leave the area and perform a whole body frisk
 - c. Continue working and frisk when job is completed
 - d. Leave the area and notify Health Physics
- 38. While working inside a controlled area you puncture your glove and receive a small cut on your hand you should _____.
 - a. Replace the glove and continue working
 - b. Leave the area and frisk your hand, if clean return to work
 - c. Leave the area and contact Health Physics
 - d. Leave the area, frisk and report to the RFS.
- 39. While performing a whole body frisk, when should you notify Health Physics of possible contamination?
 - a. Any sustained frisker reading above background
 - b. Any sustained reading of 100 cpm above background
 - c. When the frisker alarm sounds
 - d. If the contamination cannot be easily removed

- 40. The legal requirements for radiation protection are established by
 - a. Nuclear Regulatory Commission (NRC)
 - b. International Atomic Energy Agency (IAEA)
 - c. Environmental Protection Agency (EPA)
 - d. Occupational Safety & Health Agency (OSHA)
- 41. Ensuring that workers receive adequate training in radiation protection is the responsibility of ______.
 - a. Each worker
 - b. The license holder
 - c. Department supervisors
 - d. OSHA
- 42. Where is the NRC Notice to employees (NRC form-3) listing your rights as radiation workers available?
 - a. Nailed to a tree on the south end of the site
 - b. Posted inside each Contaminated Area
 - c. In the Emergency Operations Program
 - d. Clearly posted in all buildings on site

43. While working in a highly contaminated area your co-worker receives a severe cut on the arm. what should you do first?

- a. Move the individual to a non-contaminated area.
- b. Call for help and try to stop the bleeding (If qualified)
- c. Help him walk to the first aid station.
- d. Contact Health Physics

44. At your supervisors direction you dump a drum of potentially contaminated trash into the dumpster. The result of this action can be ______.

- a. The company is fined by the NRC
- b. You can be fired
- c. You can be held criminally liable
- d. All of the above

45. After completing a job inside a contaminated area you need to bring your tools outside the contaminated area, you should _____.

- a. Wipe down the tools and contact Health Physics
- b. Wipe down the tools and frisk them when you leave
- c. Leave the tools in the area and obtain a new set
- d. Smear the tools and check the smear with a frisker

46. You find a container marked Radioactive Material inside the office spaces you should.

- a. Move the container into a Contaminated Area
- b. Quickly move the container outside
- c. Warn people in the area and contact the NRC
- d. Warn people in the area and contact Health Physics
- 47. When can you enter a contaminated area without personal protective equipment?
 - a. When a health physics representative approves
 - b. When told to by your supervisor
 - c. Never
 - d. When no one is looking
- 48. Why should liquids never be put into a Rad Waste bag?
 - a. Liquids add excessive weight to the waste container
 - b. Liquids can leak out and spread contamination
 - c. Liquids can cause the waste to rot
 - d. Liquids can evaporate and cause airborne contamination

- 49. Which of the following would be an effective way to reduce radioactive waste?
 - a. Do not take packing material into a contaminated area
 - b. Plan jobs to prevent unnecessary trips into the area
 - c. Whenever possible use tools and equipment already in the area
 - d. All of the above
- 50. When may a worker with a cut, scratch, or sore be allowed to enter a Health Physics Contaminated area?
 - a. After a proper bandage is applied
 - b. Only with site medical approval
 - c. No cuts scratches or sores allowed in restricted areas
 - d. After Health Physics has checked the injury and given specific approval.

1.0 PURPOSE

This procedure provides instructions for monitoring personnel for exposure to radiation in the workplace. Adherence to this procedure will provide reasonable assurance that exposures to radiation will be properly monitored enabling exposure to be controlled to As Low As Reasonably Achievable (ALARA).

2.0 APPLICABILITY

External radiation monitoring shall be conducted when it is likely that an adult will exceed 10% of the annual limits listed in 10 CFR 1201(a) or at a more conservative limit chosen by the RSO or duly authorized representative.

This procedure will be used for monitoring of all personnel for exposure to radiation. Monitoring will be provided as described in the site specific work plan for the job to be accomplished.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

Not Applicable

3.2 Limitations

Not Applicable

- 3.3 Requirements
 - 3.3.1 Site Registration Form
 - 3.3.1.1 All new personnel and visitors required to enter a RCA must complete a Site Registration Form (AP-008-01) prior to starting work at a facility.
 - 3.3.1.2 Complete Site Registration Form will be retained with the individual personnel exposure file. Site Registration Forms for CABRERA personnel will be updated annually or earlier if existing information is known to be incorrect.
 - 3.3.2 Occupational Radiation Exposure History
 - 3.3.2.1 An NRC Form 4 or equivalent must be completed by each individual and reviewed by the RSO or duly authorized representative prior to the individual being permitted to work

in a radiological controlled area (RCA) where a dose of more than 25 mrem could be received.

3.3.3 Dosimetry Assignment

- 3.3.3.1 The Thermoluminescent Dosimeter (TLD) badge number, name, social security number, whether or not a worker has a completed NRC Form 4 or equivalent, the monitoring period (date from...to) and the individuals date of birth shall be recorded on OP-008-01, for each individual monitored on a project. The original form will be maintained as a permanent record of the project monitoring. A copy will be maintained in the CABRERA, East Hartford office.
- 3.3.4 Occupational Exposure Limits & Administrative Control Levels.
 - 3.3.4.1 Nuclear Regulatory Commission limits per calendar year:

	0	Whole Body (TEDE)	5 Rem
	•	Lens Dose Equivalent (LDE)	15 Rem
ţ	0	Shallow Dose Equivalent (SDE) (Skin or Extremity)	50 Rem
	9	Organ Dose (CDE)	50 Rem
3.3.4.2	? A	dministrative Control Levels (per quarter)	
	•	Whole Body (TEDE)	1.25 Rem
	•	Lens Dose Equivalent (LDE)	3.75 Rem
	•	Shallow Dose Equivalent (SDE) (Skin or Extremity)	12.5 Rem
	•	Organ Dose (CDE)	12.5 Rem

- 3.3.4.3 The CABRERA RSO or duly authorized representative shall authorize exposure above the Quarterly Administrative Control Levels.
- 3.3.5 Radiological Control Areas
 - 3.3.5.1 An RCA is considered to be any portion of a facility, plant, vehicle or project for which restrictions apply for purposes of occupational radiation exposure control. Radiation

- exposures received within the boundary of a restricted area are occupational exposures. As described in the applicable Project Detail Work Procedure, RCAs will be established to provide the specific radiological controls necessary for the completion of the work scope and the protection of all project personnel. The following guidelines apply:
- 3.3.5.2 An RCA is always located within a restricted area as defined by 10 CFR 20. Each radiation area, high radiation area, airborne radioactivity area and contaminated area shall be contained within an RCA.
- 3.3.5.3 Personnel and casual visitors within an RCA will be provided with appropriate dosimetry and monitored for radiation exposure when appropriate.

3.3.6 Radiation Work Permits

- 3.3.6.1 Personnel working in an RCA must be assigned to a specific RWP applicable to the job being performed.
- 3.3.6.2 Personnel performing work requiring a DRD shall sign in on Form AP-008-06, DRD Dose Tracking Log, prior to the start of work indicating the time of entry, starting DRD dose, and DRD serial number. Upon completion of the work or at the end of shift, personnel shall sign out on the DRD Dose Tracking Log, indicating the time out and the current DRD dose.
- 3.3.6.3 A weekly accumulated estimated exposure report, based upon Direct Reading Dosimeter (DRD) results, will be maintained and posted for employee review at the start of each workweek. This report will reflect a running total of exposure available for the current calendar quarter. The beginning quarterly available exposure will be 1250 mrem for the individuals with a completed and signed Occupational Exposure History Form.

3.3.7 Occupational Radiation Exposure History Request

3.3.7.1 An Occupational Radiation Exposure Request, AP-008-05 will be completed for all personnel for whom permanent exposure results have been obtained. Copies of this letter will be sent to the individual, and maintained in the individual's personnel exposure file by the CABRERA Radiation Safety Office, East Hartford.

3.3.7.2 Any time CABRERA is required to report an individual's exposure to the Nuclear Regulatory Commission or other regulatory agency, a copy of the report will be sent to the individual.

3.3.8 Project Records / Documentation

3.3.8.1 Upon completion of the project, it will be the responsibility of the RFS or designee to forward all project records, logs, and communications regarding personnel exposure, exposure records, dosimetry records, and all other pertinent information about personnel dosimetry and individual radiation protection for RSO or duly authorized representative review, and filing in anticipation of NRC review.

4.0 REFERENCES

•	RSP	Radiation	Safety	Program
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AP-001 Record Retention

AP-012 Radiation Work Permits

OP-001 Radiation and Contamination Surveys

• AP-009 Training Program

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Monitoring Measurement of radiation exposure to evaluate potential dose equivalent to the individual.
- 5.2 Dosimetry Devices worn on the body (TLD or DRD) to measure the radiation dose received by the exposed individual.
- 5.3 Dose The deposition of energy in matter. Equivalent to the radiation dose times the quality factor for the type of radiation.
- 5.4 Quality Factor The factor, which is radiation dependent and identifies the relative biological effectiveness of a radiation type and energy. The quality factor is multiplied times the Dose to yield the Dose Equivalent.
- 5.5 TEDE The Total Effective Dose Equivalent The sum of the Deep Dose Equivalent (external dose) and the Committed Effective Dose Equivalent (internal dose).

- 5.6 CDE Committed Dose Equivalent The dose equivalent to organs or tissues that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.
- 5.7 CEDE Committed Effective Dose Equivalent The sum of the products of all organs or tissues with CDE and their respective weighting factors.
- 5.8 SDE Shallow Dose Equivalent Applies to the skin and to any extremity, it is used for external radiation which cause primary energy deposition in the first 0.007 cm of tissue averaged over one square centimeter.
- 5.9 LDE- Eye Dose Equivalent The dose delivered to the lens of the eye at a tissue depth of 0.3 centimeters.
- 5.10 DDE Deep Dose Equivalent The dose equivalent delivered by external radiation to tissue at a depth of 1 centimeter.
- 5.11 TLD Thermoluminescent Dosimeter A device which provides passive measurement of DDE, SDE, and/or LDE.
- 5.12 DRD Direct Reading Dosimeter A self indicating, integrating radiation exposure measuring device, (e.g. pocket ion chamber).

6.0 EQUIPMENT

None

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) The PM is responsible for ensuring that personnel assigned the tasks using radioactive or hazardous materials are properly trained in their use and the necessity that they be monitored for exposure to radiations and hazardous materials as described in the site specific work plan.
- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of personal monitoring devices for radiation and hazardous materials.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.

- 7.4 Health Physics Technicians (HPT) The HPT are responsible for performing the surveys described in the site specific work plan and ensuring the proper use of monitoring devices by workers.
- 7.5 Workers All personnel are required to wear their dosimerty as required by the RWP and to maintain their exposure to radiation ALARA.

8.0 INSTRUCTIONS

- 8.1 Radiation Dosimetry TLD
 - 8.1.1 At a minimum, TLD's provided by a NVLAP certified vendor for the exposure period, will be used to monitor all personnel who could potentially receive 10% or more of the permissible dose limit for external radiation exposure. Personnel working in areas with dose rates above 5 mrem/hour, will wear a TLD and a low range Direct Reading Dosimetry (DRD). Other appropriate radiation exposure monitors will be assigned accordingly (e.g., extremity dosimetry) at the discretion of the RSO or duly authorized representative.
 - 8.1.2 TLD's are the permanent record of an individual's occupational radiation exposure. Upon receipt of project dosimetry, TLD's and extremity dosimetry shall be stored in a low background area inside the project main office or in other designated storage locations when not in use. A (TLD) control badge shall be kept where the assigned badges are stored when they are not in use. All CABRERA personnel entering a RCA where 25 mrem could be received will be issued, at a minimum, a TLD.
 - 8.1.3 The individual's name, social security number, issue date, and date of return will be recorded on form AP-008-03.
 - 8.1.4 The TLD, which monitors DDE, SDE, and/or LDE, shall be worn on the front torso in the region of the torso, expected to receive the highest dose. In cases where other areas of the body may receive a higher dose, the HPT shall evaluate and formally require (by specification on the RWP) that the dosimetry be worn at that body location. Multibadging may be utilized in certain situations as deemed appropriate by the RSO/RFS.
 - 8.1.5 Extremity monitoring shall be provided when necessary as described by the specific site work plan, or at the discretion of the RSO/RFS.
- 8.2 Direct Reading Dosimeters

8.2.1 Personnel working in a RCA may be issued/monitored by a DRD. DRD's may either be issued for an individual or group depending on the type and duration of work to be performed. The RFS or RSO will determine if it will be necessary to issue individual or group DRD's. The DRD's used for general radiation work will have a range of 0 to 200 millirem. DRD's will be reset to zero (0) at the start of each work shift.

8.3 Visitors/Group Monitoring

- 8.3.1 A casual visitor is any person touring or visiting the RCA on an infrequent basis, escorted while in the restricted area and not performing or supervising hands on work.
- 8.3.2 Visitors will be issued a TLD on a case by case basis depending on the type and duration of the job. The RFS or RSO shall determine if a TLD is to be issued to a visitor. TLD's will always be issued to contractors expected to exceed 500 mrem. A visitor expected to receive in excess of 25 mrem shall be trained and provided dosimetry.

8.4 Visitor RCA Conditions

- 8.4.1 A visitor may be escorted into a RCA provided that:
 - 8.4.1.1 No entries into a high radiation areas, surface contamination areas, or airborne radioactivity areas shall be allowed,
 - 8.4.1.2 External radiation exposure is limited to 50 mrem per year, or 10 mrem per entry.
 - 8.4.1.3 The visitor is furnished with dosimetry, when appropriate.

8.5 Visitor Dosimetry

- 8.5.1 Visitors within an RCA shall receive, as a minimum, a low range 0-200 mR Direct Reading Dosimeter (DRD)
- 8.5.2 Visitor TLD results are recorded on form AP-008-01, which is maintained at the facility. When a visitor is issued a TLD, the individual's, name, social security number, issue date, and date of return will also be recorded on form AP-008-03.
- 8.6 Lost, Damaged or Questionable Dosimetry
 - 8.6.1 In the event of a Lost, Damaged or Questionable TLD or DRD, the RFS or RSO shall be notified immediately. A Lost, Damaged or

Questionable Dosimetry Report, (AP-008-02) will be completed and filed in the individual's exposure file. The dose estimated from all exposure received while the individual was in an exposure situation must be determined and recorded in the individual's dose record.

- 8.6.2 In the event of multiple occurrences, the RSO or duly authorized representative shall be notified immediately.
- 8.7 Dropped or Off-Scale Personal Ion Chambers
 - 8.7.1 If a DRD is dropped or if it's hairline is no longer visible (off-scale), the response of this device may no longer be valid and an estimate of the dose received by an individual must be made based on; dose rates and time in the work area, typical dose received on that type of job, or the dose received by another person doing the same type of work in the same area. Form AP-008-02 shall be used to document this type of situation. The dose determined shall be added to the dose record at the discretion of the RSO. The RSO or duly authorized representative shall review, approve, and maintain all completed dose estimates.
- 8.8 Project Dosimetry Issuance/Control
 - 8.8.1 Prior to project commencement, the RFS and/or the RSO will determine the appropriate radiation monitoring dosimetry required based upon the radionuclides and activity present at the work area. The RFS will contact the RSO to provide the following information:
 - CABRERA Project Name and Account Number
 - Project start date and project duration
 - Suggested dosimetry required for project, including radiation type to monitor for
 - Quantity of dosimeters requested on a quarterly basis including controls
 - Name, address, social security, birth date of project personnel to be monitored.
 - Address dosimetry is to be shipped to.

- 8.8.2 Personnel assigned to projects will wear the appropriate dosimetry for no more than one quarter or the duration of the project, whichever is shortest.
 - 8.8.2.1 It will be the responsibility of the RFS or RSO to return dosimetry to the vendor for processing at the end of each quarterly monitoring period.
 - 8.8.2.2 If the original projected project duration is extended, the RFS or designee shall inform the RSO so that the proper arrangements can be made to supply additional dosimetry from the vendor.
 - 8.8.2.3 The quarterly issue period may be extended at the discretion of the RSO or duly authorized representative. Extensions shall be "with cause" actions and documented by memo, at a minimum.
 - 8.8.2.4 Dosimetry shall be maintained on site in a low dose rate area with control(s), when not being worn by personnel.
- 8.8.3 Dosimetry Processor (Vendor)
 - 8.8.3.1 The dosimetry vendor must be NVLAP certified in accordance with the project Health and Safety Plan and 10 CFR 20.1501.
 - 8.8.3.2 Upon receiving project dosimetry, the RFS or designee shall verify that the dosimetry received meets the requirements of the project. Any problems should be reported to the CABRERA RSO or duly authorized representative for immediate attention and resolution. All documentation received with dosimetry will be filled out completely. When all required preliminary training documentation has been completed as described in the project Detail Work Procedure, dosimetry will be issued to project personnel.
- 8.9 It is the responsibility of the RFS or designee to ensure that AP-008-03 is completed at the time of dosimetry issuance and a copy is sent to the CABRERA East Hartford Office location.

9.0 QUALITY ASSURANC/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 DRD's shall be calibrated by a certified laboratory or validated procedure every-six months when in use.

9.2 Records

- 9.2.1 Documented information shall be legibly written in ink.
- 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.3 The health physics technician using this procedure shall ensure that it is the most current and approved revision.
- 9.2.4 The health physics technician shall review Forms AP-008-01 through AP-008-04 for accuracy and completeness.
- 9.2.5 Entries on Forms AP-008-01 through AP-008-04 and any other pertinent forms must be dated and initialed by the health physics technician performing the inventory to be valid.
- 9.2.6 The RSO or duly authorized representative shall review completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

• AP-008-01	Site Registration Form
• AP-008-02	Lost, Damaged or Questionable Dosimetry Report
• AP-008-03	Radiation Dosimetry Issue Log
• AP-008-04	Radiation Exposure Report
• AP-008-05	Occupational Exposure History Request NRC Form 4
• AP-008-06	DRD Dose Tracking Log

AP- 008-01 Site Registration Form

ADI	MINISTRATIVE INFORMATION		
Name:	Date:		
Social Sec. No.:	Date of Birth:	•	
Permanent Address:			
Employer's Name:			
Employer's Address:	*		
CABRERA Project Name/No.:			
Project Contact:			
Signature:	Date:		
	DOSIMETRY USE ONLY		
DRD No.:	DRD Reading:	mrem	
TLD Badge No.:	TLD Badge Results	mrem	•
RADIATI	ON SAFETY OFFICER APPROVA	L	
This person has met the requirements for radia	ation work as specified in the CABRERA Radia	tion Safety Manual: Yes	No
This person meets the requirements for radiation	on work with consideration of the notes below	v: Yes	No
Notes:			
CABRERA RSO Signature:			

AP-008-02 Lost, Damaged or Questionable Dosimetry Report

	ADMINISTRATIVE		
Report Date/Time:			
Project Name/No.:			
Project Manager/Contact:			·
Individual's Name/SSN:			
Badge No.:	, .		
Date/Time of Incident:			
Location if known:			·
Applicable RWP No.:			
Date Badge was Issued:		je tre sylvens i tra i vije vije.	
DO	OSE CALCULATION		
Dose from dosimeter readings	(Total from date issued) thru	(Date) =	mrem
2. Current dosimeter reading	(If more than one dosimeter, use hig	phest reading) =	mrem
3. If individual was not wearing a dosimeter, in the same area . If none, use dose rate x tin		exposure received by	workers
Dose Rate	(mrem/hour) x Time	(hours) =	mrem
Total estimated exposure to be assigned:		=	mrem
THE METHOD USED TO ESTIMATE AND THE ESTIMATE DOSE ASSIGN EVENT.			
Individual's Signature:	Date:		
DOSE R	ECORD AUTHORIZATION	· .	
Dose Estimate Calculations By:		Date:	
Dose Estimate Reviewed By:(RSO)_		Date:	
Dose Estimate Posted By:) Date:	

AP-008-03 Radiation Dosimetry Issue Log

Project/Loc		-1		Badge Series No.:			
TLD#	Name	SSN	Form 4 (Y/N)	Dates (From/To)	DOB		
			·		•		
				·			
	-		·				
				-			
		 					
	·						
			·				
			· · · · · · · · · · · · · · · · · · ·				
eviewed	by:		Proposer 2	Date:			
				·			
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AP-008-04 Radiation Exposure Record

Name:				SSN:					
Birth Date:									
TLD Badge	Vo.:							!	
Quarterly Wi	hole Bod	ly Dose: 1 ^s	et	2 nd	3 rd	4 th	·		
Lifetime Who	ole Body	Dose Equi	ivalent:	(R	lem) Mon	itoring Yea	r:		
Monitoring Period	Whole Body (DDE)	Shallow Dose (SDE)	Extremity Dose (SDE)	Lens Dose (LDE)	Organ Dose (CDE)	internal Effective Dose (CEDE)	Total Effect Equivalent - (DDE+CED TEDE/Cum	- Rem E)	
January									
February				* · · · · · · ·					
March									
April									
May									
June									
July									
August									
September									
October				·					
November				,					
December									
Yearly Totals									
Notes:									
N/M = Not Mor					····				
Reviewed:		,		<u> </u>	_	Datte:			
RSO:					-	Date:			
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AP-008-05 OCCUPATIONAL RADIATION EXPOSURE HISTORY

Name:	SSN:	
Address:		
Date of Birth:		
The above individual was monitored by:	TLD:	Direct Reading Dosimeter:
This is a:	Record:	Estimate:
Monitoring Device Number:	· ·	•
The monitoring period was: From:	To:	
The Occupational Radiation Exposure was	received during:	
Assignment for:	License No.: _	
Address:		
City/State/ZIP:		·
Telephone:		
RADIATION EX	POSURE RESU	JLTS
Deep Dose Equivalent for the period stated	above:	Rem (DDE)
Shallow Dose (skin) for the period stated ab	ove:	Rem (SDE)
Extremity Dose for the period stated above:	· · · -	Rem (SDE)
Eye Dose Equivalent for the period stated a	bove:	Rem (LDE)
Committed Effective Dose Equivalent (Interest	nal):	Rem (CEDE)
Total Effective Dose Equivalent (DDE + CE	DE):	Rem (TEDE)
This report is furnished to you under the provision CFR Part 20 titled "Standards for Protection Against the reference."	ons of Nuclear Regu ainst Radiation". Yo	ulatory Commission Regulation 10 ou should preserve this report for
Radiation Safety Officer:		_ Date:
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AP-008-06 DRD Dose Tracking Log

Name	Date	DRD Serial No.	Time In	Dose In	Time Out	Dose Out	Net Dose
,							
	,						
		,					
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	1						

Reviewed:		Date:
RSO:		Date:
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1.0 PURPOSE

This procedure provides the methods for operating alpha/beta survey meters when performing contamination surveys. Adherence to this procedure will provide reasonable assurance that the surveys performed have reproducible results.

2.0 APPLICABILTY

This procedure will be used by Cabrera Services, Inc. (CABRERA) personnel to measure fixed and removable alpha and/or beta emitting radioactive material on facility surfaces, equipment, waste packages, personnel, personnel protective clothing, etc.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

3.1 Precautions

- 3.1.1 Ensure that the thin Mylar or mica window on the probe face is protected from punctures during survey operations.
- 3.1.2 If any instrument inconsistencies are observed (e.g., unusually high or low background readings, source checks outside the acceptable range, etc.), remove the instrument from use, label it "OUT OF SERVICE" and report the condition to the Radiation Safety Officer (RSO) or duly authorized representative.

3.2 Limitations

None

3.3 Requirements

- 3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).
- 3.3.2 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.
- 3.3.3 Survey instrument calibrations shall be performed by an NRC or Agreement State licensed calibration facility.

4.0 REFERENCES

•	RSP	Radiation Safety Program
•	AP-001	Record Retention
	OP-001	Radiological Surveys
•	OP-009	Use and Control of Radioactive Check Sources

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area containing radioactive material(s) to which access is controlled to protect individuals from exposure to ionizing radiation.
- 5.2 Alpha/Beta Contamination Survey A survey technique to determine fixed and removable alpha/beta contamination.
- 5.3 Acceptance Range A range of values that describe an acceptable daily instrument source check result.

6.0 EQUIPMENT

- 6.1 For Alpha Surveys Ludium Model 43-5 probe and Ludium Model 3 survey meter or equivalent meter/probe combination.
- 6.2 For Beta Surveys Ludium Model 44-9 probe and Ludium Model 3 survey meter or equivalent meter/probe combination.

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of operating contamination survey meters are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of contamination survey meters described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT operating contamination survey meters are responsible for knowing and complying with this procedure.

8.0 OPERATION

- 8.1 Instrument Inspection
 - 8.1.1 Select the contamination survey meter and probe to be used in the survey.
 - 8.1.2 Before each use, perform the following checks:
 - 8.1.2.1 Verify the instrument has a current calibration label.
 - 8.1.2.2 Visually inspect the instrument for physical damage or defects.
 - 8.1.2.3 Position the meter switch to "BAT". Check to see that the needle falls within the "Bat Test" checkband.
 - If the needle falls below the "Bat Test" checkband, install new battery(s).
 - If the needle still falls outside the "Bat Test" checkband after the installation of new battery(s), tag the instrument "Out of Service" and notify the RSO or duly authorized representative.
 - 8.1.2.4 Check alpha detectors for light leaks by pointing the mylar window of the detector toward a light source and observing no change in the meter indication.
 - 8.1.3 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.2.1 through 8.1.2.44 and notify the RSO or duly authorized representative.
- NOTE:

Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or duly authorized representative be notified.

- 8.2 Pre-operation of instrument
 - 8.2.1 Position the meter fast/slow ("F/S") switch to "S".
 - 8.2.2 Position the meter switch to the appropriate range scale.
 - 8.2.3 Obtain an OP-020-01 Form.
 - 8.2.4 If a Quality Control (Q.C.) acceptance range has not already been calculated on the OP-020-01 Form, then follow the instructions below, other wise proceed to step 8.2.5.

- 8.2.4.1 Ensure the source and detector are in documented reproducible positions, which will be used each time this check is performed. Document this position on Form OP-020-01.
- 8.2.5 Place the QC check source and detector in the documented position on Form OP-020-01.
- 8.2.6 Allow the instrument reading to stabilize (approximately 30 seconds). Compare the reading to the response check criteria on Form OP-020-01. If the response reading falls outside of the acceptance range, tag the instrument "Out of Service" and notify the RSO or duly authorized representative.
- 8.3 Contamination Survey Techniques

Caution:

The window area of alpha detectors are covered with a very thin (1 mg/cm²) aluminized Mylar window and beta detector windows are 1.7 mg/cm² mica. Either window can be easily when surveying areas, which have protruding fragments that might puncture the detector face. Remove these fragments before performing surveys.

Note:

To maintain the calibrated detection efficiency, the detector must be held at the appropriate height, determined during calibration, when surveying. For example, if a beta probe's efficiency was calculated at 1/2 inch from the calibration source, the detector must be held at 1/2 inch from the surface being surveyed to maintain calibrated detection efficiency.

Note:

Avoid contacting the detector probe to the area being surveyed. This potentially could contaminate the probe.

- 8.3.1 Verify the instrument selector switch is in the X 0.1 position.
- 8.3.2 For a stationary reading, place the detector over the area to be measured and allow meter to stabilize. Record the average meter indication in either CPM α/PA (probe area) or CPM β/PA on applicable forms.
- 8.3.3 For a scan survey move the detector slowly over the surface (less than one detector width per second). Observe meter indication. If increased readings are observed return to the area and obtain a stationary reading. Record maximum area meter indication in either CPM α/PA or CPM β/PA, on applicable forms.
- 8.4 Final Verification

Upon completion of work activities, repeat steps 8.1.2.1 through 8.2.2.4 and

8.2.5 through 8.2.6, as a final verification that the instrument is working properly

8.5 Interpretation of Results

The meter reading on the alpha and beta survey meters must be corrected for detector efficiency and detector surface area before comparing results with the contamination units in Section 3.6 of the Radiation Safety Program. The conversion from CPM α /PA or CPM β /PA to DPM α /100 cm² or β /100 cm² is performed using the following equation.

$$(DPM / 100 cm^2) = \frac{(AxB)}{C}$$

Where:

- A = Alpha or Beta survey meter indication in net CPM α/PA or β/PA (i.e. Gross Alpha or Beta Survey Counts minus background counts = Net CPM/PA)
- B = 100 cm² divided by the effective detector surface area in cm². With an effective surface area of 50 cm² for the Ludlum 43-5 alpha detector, the value of B is approximately 2 or for the 15 cm² for the Ludlum 44-9 beta detector, the value of B is approximately 6.7.
- C = Detector efficiency (expressed as decimal).

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 The health physics technician performing the survey shall ensure that this procedure is the most current and approved revision.
- 9.2 Records
 - 9.2.1 Documented information shall be legibly written in ink.
 - 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
 - 9.2.3 The HPT performing the survey shall review Form OP-020-01 and any other applicable forms for accuracy and completeness.
 - 9.2.4 Entries on Form OP-020-01 and any other pertinent forms must be dated and initialed by the HPT performing the survey to be valid.

9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-020-01 Survey Meter Source Check

Survey Meter Source Check Form

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1.0 PURPOSE

This procedure provides instruction on the operation and setup of an alpha/beta sample counter. Adherence to this procedure will provide reasonable assurance that the surveys performed have reproducible results.

2.0 APPLICABILITY

This procedure will be used by Cabrera Services, Inc., (CABRERA) personnel operating an alpha/beta sample counter during surveys. Types of surveys that may use an alpha/beta sample counter are:

- Smear surveys performed to determine the removal of alpha and beta contamination on facility surfaces, equipment, waste, and source packages, etc.
- Air sample surveys performed in a workers breathing zone to determine alpha and beta air concentrations.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

3.1 Precautions

- 3.1.1 If any instrument inconsistencies are observed (e.g., unusually high or low background counts, source checks outside the tolerance range, etc.), remove the instrument from use and report the condition to the RSO or duly authorized representative.
- 3.1.2 Individuals performing work with an alpha/beta counter shall be familiar with the requirements set forth in the current and approved version of this procedure.

3.2 Limitations

3.2.1 This instrument should be set up for use in low background area as determined by the RSO or duly authorized representative.

3.3 Requirements

- 3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).
- 3.3.2 Survey instrument calibrations shall be performed by an NRC or Agreement State licensed calibration facility.

3.3.3 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.

4.0 REFERENCES

• RSP	Radiation Safety Program
 AP-005 	ALARA Program
 AP-001 	Record Retention
 AP-013 	Packaging Radioactive Material
 OP-001 	Radiological Surveys
 NUREG-1556 	Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.
- 5.2 Smear sample survey a technique using a two-inch diameter filter papers to determine removable contamination of alpha and/or beta emitting radioactive material.
- 5.3 Air sample survey a technique in which particulates are collected from a known volume of air drawn through a filter paper and concentrations of airborne alpha and beta activity associated with the particulates is determined by sample counting.
- 5.4 Plateau portion of a voltage curve where changes in operating voltage introduce minimum changes in the counting rate.
- 5.5 Chi-square test A statistical test to evaluate the operation of a sample counter by determining how data fit a series of counts to a Poisson distribution.
- 5.6 Daily calibration A determination of alpha and beta sample counting efficiency by counting National Institute of Standard Technologies (NIST) radioactive standards.

6.0 EQUIPMENT

Ludlum model 2929 or equivalent

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of operating alpha/beta sample counters are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of alpha/beta sample counters described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT using alpha/beta sample counters are responsible for knowing and complying with this procedure.

8.0 OPERATION

- 8.1 Instrument Inspection
 - 8.1.1 Before each use, perform the following checks:
 - 8.1.1.1 Verify the instrument has a current calibration label.
 - 8.1.1.2 Visually inspect the instrument for physical damage or defects.
 - 8.1.2 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.1.1 through 8.1.1.2 and notify the RSO or his duly authorized representative.
- NOTE: Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or his duly authorized representative be notified.
 - 8.2 Initial Startup.
 - 8.2.1 Turn high voltage potentiometer to its lowest position (fully counterclockwise).
 - 8.2.2 Turn instrument on.

- 8.2.3 The operator can select one of four operational procedures depending on the function to be performed. Before performing any of the following complete steps 8.1.1 to 8.1.2.
 - a) Plateau Curve The Plateau Curve is used to find the proper operating voltage of the instrument and will be performed at the discretion of the RSO or duly authorized representative. This test shall be documented on the attached Form OP-021-01 or equivalent.
 - b) Chi-square Test The Chi-Square Test will be performed at the discretion of the RSO or duly authorized representative in order to test the operational adequacy of the instrument and will be recorded on Form OP-021-02. This test statistically evaluates the sample counter against a poisson distribution.
 - c) Daily Calibration Check This portion of the procedure is performed before samples are counted on any day the instrument is in use.

8.3 Plateau Curve

NOTE: Before beginning, record the previous calibration high voltage values.

- 8.3.1 Set up the instrument in a low background area.
- 8.3.2 Rotate the high voltage potentiometer slowly clockwise until the meter indicates proper voltage. This proper voltage is approximately 500 volts.
- 8.3.3 Set time multiplier switch to "x1."
- 8.3.4 Set the instrument-preset timer to one (1) minute.
- 8.3.5 Insert an alpha calibration standard into the center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a one minute count.
- 8.3.6 Upon completion of the count, record high voltage reading and digital counts appearing in the instrument alpha display in the indicated columns on Form OP-021-01(Plateau Data Sheet)
- 8.3.7 Continue increasing high voltage by 50-volt increments, as described above, obtaining counts and recording data until the end of the plateau is reached. If rapid increase in count rate is observed, proceed to step 8.3.8. If not, notify the RSO or duly authorized representative.

- 8.3.8 Remove the alpha source and replace with a beta source.
- 8.3.9 Reduce high voltage reading to the voltage level chosen during Step 8.3.2 by turning potentiometer counterclockwise.
- 8.3.10 Perform one-minute counts at 50-volt increments and record the data on Form OP-020-01, until the end of the plateau is reached. If a rapid increase in count rate is observed reduce the high voltage.
- 8.3.11 Using linear graph paper or equivalent plotting system, plot alpha and beta counts on the "Y" axis and the voltage for the indicated count on the "X" axis.
- 8.3.12 Select an operating voltage 1/3 the distance beyond the knee of the plateau curve by marking the voltage on the graph and on the plateau data sheet.
- 8.3.13 Sign and date Form OP-021-01 and forward the results along with any graphs produced to the RSO or duly authorized representative for review.

8.4 Chi-Square Test

- 8.4.1 Set up the Instrument in a low background area.
- 8.4.2 Ensure the high voltage potentiometer is positioned according to the posted instrument label. Adjust if necessary.
- 8.4.3 Set the time multiplier switch to "x1".
- 8.4.4 Set the instrument-preset timer to one (1) minute.
- 8.4.5 Insert the alpha calibration standard into center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a one minute count.
- 8.4.6 Upon completion of the count, record digital counts appearing in the alpha display in the "X_i" column on Form OP-021-02 (Chi -Square Data Sheet).
- 8.4.7 Repeat counting sequence without changing settings until a total of 20 counts have been taken and recorded in the "X_i" column on Form OP-021-02.
- 8.4.8 Add the 20 counts recorded in the " X_i " column and record in the "Sum" column. Then divide by 20 to obtain the mean number of counts (X_m) and record on the line " X_m ".

- 8.4.9 Calculate the individual count "X_i" difference from the mean (X_m) value and record in the "(X_i-X_m)" column on Form OP-021-02 for all 20 values.
- 8.4.10 Calculate $(X_i-X_m)^2$, sum the " $(X_i-X_m)^2$ " column, and record on Form OP-020-02.
- 8.4.11 Calculate the value of Chi- Square using the following formula.

$$X^2 = \frac{\sum (X_i - X_m)^2}{X_m}$$

- 8.4.12 The value of Chi-square should be between 8.91 and 32.8 (represents a probability between 0.025 and 0.975). Record this value at "X²". If the Chi-square value falls outside this range, contact the RSO or duly authorized representative for further instructions.
- 8.4.13 Sign and date Form OP-021-02 and forward the results to the RSO or duly authorized representative for review.
- 8.5 Daily Calibration Check
 - 8.5.1 Ensure the high voltage potentiometer is positioned according to the posted instrument label. Adjust, slowly, if necessary.
 - 8.5.2 Set time multiplier switch to "x1".
 - 8.5.3 Set the instrument-preset timer to five (5) minutes.
 - 8.5.4 Record the source type to be used and corresponding serial number on the proper line indicated on Form OP-021-03. Use separate rows of the form for each source efficiency to be calculated.
 - 8.5.5 Insert a blank sample into the center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a five minute background count.
 - 8.5.6 Calculate and record the background total counts and count rate in the columns labeled "Total Counts" and "BKG CPM" respectively, under Background Information on Form OP-021-03. The background count rate in CPM (counts per minute) can be calculated as follows:

$$CPM = \frac{Total Counts}{Total Time}$$

- 8.5.7 Remove the blank sample and insert the alpha or beta calibration standard into the center of the sample tray, slide the sample tray under the detector and depress the "COUNT" button to obtain a five minute count.
- 8.5.8 Upon completion of the measurement, calculate and record the total counts and count rate in the columns labeled "Total Counts" and "CPM" respectively, under Source Information on Form OP-021-03. The count rate (CPM) can be calculated as listed in Step 8.5.6.
- 8.5.9 Calculate Net Source CPM as below and record on Form OP-021-03 under "Net CPM".

Net Source CPM = CPM - BKG CPM

NOTE: Obtain activity (DPM) value from the source certification paperwork. Decay correct activity, if needed.

8.5.10 Use the source disintegration per minute (DPM) to calculate the efficiency as shown below and record as a decirnal on Form OP-021-03.

% Efficiency=
$$\frac{Net Source CPM}{DPM}$$
*100

- 8.5.11 To calculate the efficiency for the next source, remove the current source standard, insert a new source standard and repeat steps 8.5.1 through 8.5.10, as necessary.
- 8.5.12 Remove calibration standards and place in source holders.
- 8.5.13 Generate a control chart tracking the daily efficiencies and notify the RSO or duly authorized representative if any point falls outside of 2σ variance.
- NOTE: For the first day on control chart use five data points to begin trend line.

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 The alpha/beta sample counter will be checked for proper calibration daily with a NIST traceable source when in use.
 - 9.1.2 Chi-square and plateau tests are verified and noted as currently valid.

9.1.3 The HPT shall ensure that the attachments are of the most current.

9.2 Records

- 9.2.1 Documented information shall be legible written in ink.
- 9.2.2 Data shall not be obliterated by erasing or using white-out. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed and dated.
- 9.2.3 The HPT shall review completed attachment forms for accuracy and completeness.
- 9.2.4 Entries on forms must be dated and initialed by the HPT to be valid.
- 9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

• OP-021-01	Plateau Data Sheet
• OP-021-02	Chi-Square Data Sheet
• OP-021-03	Daily Calibration Check

OP-021-01

<u>Plateau Data Sheet</u>

Date:		Reco	mmended (Operating Vo		eren er en en en en en en en en en en en en en	
Instrument	·			Serial	Number:		<u>. </u>
Alpha Soui	rce Serial N	ó		Acti	vity (dpm)		·
Beta Sourc	e Serial No.	•		Acti	vity (dpm)		
Voltage Setting	Alpha Counts	Voltage Setting	Alpha Counts	Voltage Setting	Beta Counts	Voltage Setting	Beta Counts
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Prepared B	3y:					Date:	
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OP-021-02

Chi-Square Data Sheet

Date:Instrumer	nt:	Serial Number:	X ²		
Alpha Source No./Activity	y:	_Beta Source No./Activit	y:		
Count Number	Xi	(X _l -X _m)	$(X_i-X_m)^2$		
1					
2					
3					
4					
5					
6					
. 7					
8					
9					
10	-				
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
Sum		mmmmmmmmmmm			
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Prepared By:	Print/Sig	Da	te:		
Reviewed By:	Date:				
	Print/Sig	gn			
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OP-021-03

Daily Calibration Check

Instrument Serial No Alpha Source No./Activity Beta Source No./Activity								
		Information		Source Information				
Date/Time	Total Time	Total Counts	BKG CPM	Total Time	Total Counts	CPM	Net CPM	% Eff
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OP-021-04		 	Cabre	ra Service	es, Inc.		Pag	e 11 of 1

1.0 PURPOSE

This procedure provides the methods for operating ion chamber instruments for dose rate surveys. Adherence to this procedure will provide reasonable assurance that the radiological surveys performed have reproducible results.

2.0 APPLICABILITY

This procedure will be used by Cabrera Services, Inc. (CABRERA) CABRERA personnel to operate Ionization chambers during dose rate surveys.

3.0 PRECAUTIONS, LIMITATIONS, AND REQUIREMENTS

- 3.1 Precautions
 - 3.1.1 During surveys, exercise care not to puncture the thin Mylar window.
 - 3.1.2 If any instrument inconsistencies are observed (e.g., unusually high or low background readings, source checks outside the acceptable range, etc.), remove the instrument from use, label it "OUT OF SERVICE" and report the condition to the RSO.
- 3.2 Limitations

Not Applicable

- 3.3 Requirements
 - 3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).
 - 3.3.2 Survey instrument calibrations shall be performed by a NRC or Agreement State recognized and licensed calibration facility.
 - 3.3.3 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.

4.0 REFERENCES

•	RSP	Radiation Safety Program
•	ALARA	ALARA Program
•	AP-001	Record Retention
•	OP-001	Radiological Surveys
•	OP-009	Use and Control of Radioactive Check Sources
•	NUREG-1556	Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.
- 5.2 Radiation Area Any area accessible to personnel where dose rate levels from ionizing radiation are such that an individual could receive a deep dose equivalent in excess of 5 mrem in one hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.
- 5.3 Dose The deposition of energy in matter. Equivalent to the radiation dose times the quality factor for the type of radiation.
- 5.4 Quality Factor The factor, which is radiation dependent and identifies the relative biological effectiveness of a radiation type and energy. The quality factor is multiplied times the Dose to yield the Dose Equivalent.
- 5.5 TEDE The Total Effective Dose Equivalent The sum of the Deep Dose Equivalent (external dose) and the Committed Effective Dose Equivalent (internal dose).
- 5.6 CDE Committed Dose Equivalent The dose equivalent to organs or tissues that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.
- 5.7 CEDE Committed Effective Dose Equivalent The sum of the products of all organs or tissues with CDE and their respective weighting factors.
- 5.8 SDE Shallow Dose Equivalent Applies to the skin and to any extremity, it is used for external radiation which cause primary energy deposition in the first 0.007 cm of tissue averaged over one square centimeter.
- 5.9 EDE- Eye Dose Equivalent The dose delivered to a thickness of tissue 300 mg/cm² by external radiation.
- 5.10 DDE Deep Dose Equivalent The dose equivalent delivered by external radiation to tissues deeper than 1 centimeter.
- 5.11 Daily calibration A determination of alpha and beta sample counting efficiency by counting National Institute of Standard Technologies (NIST) radioactive standards.

6.0 EQUIPMENT

Ludlum model 9 Ionization Chamber or equivalent

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of operating ionization chambers are familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the use of ionization chambers described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT using ionization chamber survey meters are responsible for knowing and complying with this procedure.

8.0 OPERATION

- 8.1 Instrument Inspection
 - 8.1.1 Select the ion chamber to be used in the survey.
 - 8.1.2 Before each use, perform the following checks:
 - 8.1.2.1 Verify the instrument has a current calibration label.
 - 8.1.2.2 Visually inspect the instrument for physical damage or defects.
 - 8.1.2.3 Position the meter switch to "BAT". Check to see that the needle falls within the "Bat Test" check-band.
 - If the needle falls below the "Bat Test" check-band, install new battery(s).
 - If the needle still falls outside the "Bat Test" check-band after the installation of new battery(s), tag the instrument "Out of Service" and notify the RSO or duly authorized representative.
 - 8.1.3 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.2.1 through 8.1.2.3 and notify the RSO or duly authorized representative.

NOTE:

Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or duly authorized representative be notified.

- 8.2 Pre-operation of instrument
 - 8.2.1 Position the meter fast/slow ("F/S") switch to "S".
 - 8.2.2 Position the meter switch to the appropriate range scale.
 - 8.2.3 Obtain an OP-020-01 Form.
 - 8.2.4 If a Quality Control (Q.C.) acceptance range has not already been calculated on the OP-020-01 Form, then follow the instructions below, other wise proceed to step 8.2.6.
 - 8.2.5 Enter the QC check source, probe, and meter numbers on Form OP-020-01.
 - 8.2.5.1 Ensure the source and detector are in a reproducible geometry, which will be used each time this check is performed.
 - 8.2.5.2 Obtain ten separate measurements in a low background area.
 - 8.2.5.3 Calculate the average of the ten measurements by adding the measurements and dividing the sum by ten.
 - 8.2.5.4 Multiply the average measurement value established in 8.2.5.3 by 0.8 and record on Form OP-020-01 as the lower QC acceptance range.
 - 8.2.5.5 Multiply the average measurement value established in 8.2.5.3 by 1.2 and record on Form OP-020-01 as the upper QC acceptance range.
 - 8.2.6 Place the QC check source and detector in the proper geometry established for QC check.
 - 8.2.7 Allow the instrument reading to stabilize (approximately 30 seconds). Compare the reading to the response check criteria on Form OP-020-01. If the response reading falls outside of the acceptance range, note Fail on Form OP-020-01, tag the instrument "Out of Service" and notify the RSO or duly authorized representative. If the reading falls inside the acceptance range, note Pass on Form OP-020-01; the instrument is ready for performing surveys.

8.3 Operation of Instrument

- 8.3.1 Gamma Survey Techniques
 - 8.3.1.1 Switch the audio toggle switch to the "ON" position.
 - 8.3.1.2 Ensure the beta shield is covering the Mylar window.
 - 8.3.1.3 When entering a radiation area of unknown radiation levels turn the range selector switch to the highest scale or the highest scale for the dose rate expected. Rotate the range selector switch downscale until an upscale meter needle deflection is observed.
 - 8.3.1.4 When obtaining a gamma exposure rate place the entire detector volume in and perpendicular to the radiation field.
 - 8.3.1.5 Gamma exposure rates are obtained in the area where a worker will be located during work activities. If only a position of the workers body will be exposed to the field, the highest exposure rate will be used to determine working time.
 - 8.3.1.6 Gamma exposure rates on waste packages are obtained by placing the centerline of the detector at the indicated distance from the package and perpendicular to the radiation field.
 - 8.3.1.7 Record the highest meter indication in mR/hr and its location on the forms provided in procedure OP-001.
- 8.3.2 Survey techniques for Lens of Eye Dose

For lens of eye equivalent doses, record the dose for the beta shield in the closed configuration if the shield is 300 mg/cm² thick or less. If the beta shield is greater than 300 mg/cm², then conservatively use the beta shield in the open configuration to record equivalent dose for the lens of the eye.

8.3.3 Beta Survey Technique

Caution:

The window area of the detector is covered with a 7 mg/cm² aluminized Mylar covering and can be easily punctured. Avoid protruding fragments that might puncture the detector face.

8.3.3.1 When a higher reading is obtained with the beta shield open compared with the beta shield closed, this indicates the presence of beta radiation.

- 8.3.3.2 To obtain the beta dose first obtain a reading with the beta shield closed (CW) as described in Section 8.3.1. Next, obtain a reading with the beta shield open (OW) at the same location holding the meter in the same configuration.
- 8.3.3.3 Determine the beta dose using the following formula:

True β Dose = (OW - CW) x BCF

Where:

OW = Open Window reading (beta shield open)

CW = Closed Window reading (beta shield closed)

BCF = Beta Correction Factor (5 for reading taken at 4 centimeters - use with caution this is isotope dependent)

- 8.3.3.4 Beta dose rates to the skin or lens of the eye are obtained in the area where workers will be located during work activities. If only a portion of the workers body will be exposed to the field, the highest exposure rate will be used to determine working time.
- 8.3.3.5 Beta dose rates to the skin are obtained by obtaining measurement at 4 centimeters from the surface contacted by the worker.
- 8.3.3.6 Record the beta dose rates in mrad/hr (β) and location on the forms provided in procedure OP-001.

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 The health physics technician performing the survey shall ensure that this procedure is current.
- 9.2 Records
 - 9.2.1 Documented information shall be legibly written in ink.
 - 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
 - 9.2.3 The HPT shall ensure that the attachments are of the most current.

- 9.2.4 The HPT shall review completed attachment forms for accuracy and completeness.
- 9.2.5 Entries on forms must be dated and initialed by the HPT to be valid.
- 9.2.6 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

None

1.0 PURPOSE

The purpose of this procedure is to provide instruction for the operation of the micro-R meter for gamma radiation surveys. Adherence to this procedure will provide reasonable assurance that the radiological surveys performed have reproducible results.

2.0 APPLICABILITY

This procedure will be used by Cabrera Services, Inc. (CABRERA) personnel operating the micro-R meter during gamma radiation surveys. The micro-R meter is used to determine gamma radiation levels from facility surfaces, equipment, waste and source packages, etc., containing gamma emitting radioactive materials.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

- 3.1.1 Individuals performing work with the micro-R meter shall be familiar with the requirements set forth in the current and approved version of this procedure.
- 3.1.2 If any instrument inconsistencies are observed (e.g., unusually high or low background readings, source checks outside the acceptable range, etc.), remove the instrument from use, label it "OUT OF SERVICE" and report the condition to the Radiation Safety Officer (RSO) or duly authorized representative.

3.2 Limitations

None

3.3 Requirements

- 3.3.1 Calibration sources shall be traceable to the National Institutes of Science and Technology (NIST).
- 3.3.2 A battery check, general observation of instrument condition and source check shall be performed each day before instrument use and daily following work activities as a final verification.
- 3.3.3 Survey instrument calibrations shall be performed by an NRC or Agreement State licensed calibration facility.

4.0 REFERENCES

RSP	Radiation Safety Program
 ALARA 	ALARA Program
• AP-001	Record Retention
• OP-001	Radiological Surveys
• OP-009	Use and Control of Radioactive Check Sources
 OP-020 	Operation of Contamination Survey Meters
 NUREG-1556 	Consolidated Guidance About Material Licenses (Vol.11)

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area to which access is controlled to protect individuals against undue risks from exposure to radiation and radioactive materials.
- 5.2 Gamma Radiation Survey A survey technique to determine gamma radiation levels from radioactive material(s) in facilities, materials, landmasses, etc.
- 5.3 Acceptance Range A range of values that describe an acceptable daily instrument source check result.

6.0 EQUIPMENT

Ludlum Model 19 or equivalent

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of operating a micro-R meter is familiar with this procedure, adequately trained in the use of this procedure, and have access to a copy of this procedure.
- 7.2 Radiation safety Officer (RSO) The RSO is responsible for verifying that personnel comply with this procedure and are trained in the operation of a micro-R meter described in this procedure.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT operating the micro-R meter are responsible for knowing and complying with this procedure.

7

8.0 OPERATION

- 8.1 Instrument Inspection
 - 8.1.1 Before each use, perform the following checks:
 - 8.1.1.1 Verify the instrument has a current calibration label.
 - 8.1.1.2 Visually inspect the instrument for physical damage or defects.
 - 8.1.1.3 Position the meter switch to "BAT". Check to see that the needle falls within the "Bat Test" checkband.
 - If the needle falls below the "Bat Test" checkband, install new battery(s).
 - If the needle still falls outside the "Bat Test" checkband after the installation of new battery(s), tag the instrument "Out of Service" and notify the RSO or duly authorized representative.
 - 8.1.2 Remove and tag the instrument "Out of Service" if it fails any of the criteria in Step 8.1.1.1 through 8.1.1.3 and notify the RSO or duly authorized representative.
- NOTE: Any defects, damages or other physical abnormalities require that the instrument be removed from service and the RSO or duly authorized representative be notified.
 - 8.2 Pre-operation of instrument
 - 8:2.1 Position the meter fast/slow ("F/S") switch to "S".
 - 8.2.2 Position the meter switch to the appropriate range scale.
 - 8.2.3 If a Quality Control (Q.C.) acceptance range has not already been calculated, then follow the instructions below, other wise proceed to step 8.2.5.
 - 8.2.3.1 Ensure the source and detector are in documented reproducible positions, which will be used each time this check is performed. Document this position on appropriate form.
 - 8.2.4 Place the QC check source and detector in the documented position on appropriate form.

- 8.2.5 Allow the instrument reading to stabilize (approximately 30 seconds). Compare the reading to the response check criteria. If the response reading falls outside of the acceptance range, tag the instrument "Out of Service," and notify the RSO or duly authorized representative.
- 8.3 Operation of the instrument
 - 8.3.1 Grid Surveys
 - 8.3.1.1 Turn the audio switch to the "On" position.
 - 8.3.1.2 Verify the instrument selector switch is on the lowest scale (usually the μR position). Turn the instrument selector switch to the next higher scale only if meter indication is off scale.
 - 8.3.1.3 For a stationary grid reading in a facility or land mass, position the instrument one meter above the surface to be surveyed and allow meter to stabilize. With the instrument toggle switch set in the "SLOW" position, the meter reaches 90% of its final reading in 22 seconds. Record the average meter indication in μR/hr on appropriate form(s).

Note:

Two survey methods (step 8.3.1.4 or 8.3.1.5) can be used to obtain contact readings in the survey grids. The survey method used will be specified in the site specific work plan.

8.3.1.4 For a scan survey, make sure the meter response is set to fast and suspend the instrument from a strap which locates the detector at surface or ground level. Move the instrument slowly over the surface while walking in an "S" pattern unless otherwise instructed by the RSO or duly authorized representative. Areas, which could concentrate radioactive materials such as drainage ditches, floor cracks, and wall/floor joints, should be surveyed. Observe meter indication and listen for increases in audible clicks from the speaker. If elevated readings above background are observed, a stationary survey shall be performed (at one-meter height and at the surface) at the point of elevated activity. Record area meter indications above background in μR/hr on appropriate form.

8.3.1.5 As an alternate to the "S" pattern survey used in step
8.3.1.4, the survey grid can be divided into subgrids and
readings taken as directed by the site work plan. Elevated
measurements should be performed in the same manner as
above (i.e., at one meter and at the surface). The readings
from each measurement are recorded on appropriate form.

8.3.2 Waste Container Surveys

- 8.3.2.1 Set the instrument scale to accommodate the highest expected radiation level. If radiation levels may approach 5000 μR/hr (5 mR/hr) obtain an instrument with appropriate range before performing any radiation surveillance.
- 8.3.2.2 Slowly scan the total surface of the package and record the maximum contact reading obtained on appropriate forms.
- 8.3.2.3 Obtain instrument readings at one meter from all sides of the package and record the maximum reading obtained on appropriate form.

8.3.3 Final Verification

Upon completion of work activities, repeat steps 8.1.1.1 through 8.2.2 and 8.2.4 through 8.2.5, as a final verification that the instrument is working properly

8.3.4 Additional Information

- 8.3.4.1 In a uniform background radiation field (without interfering sources of radiation), methods such as selectively shielding the detector, soil sample analysis, etc., can be used to differentiate between extraneous radioactive sources (e.g., skyshine or radioactive waste shipment containers), naturally occurring radioactive material and/or radioactive contamination.
- 8.3.4.2 Note the location of installed devices, which contain radioactive material and could cause elevated background radiation levels in localized areas.
- 8.3.4.3 Land mass surveys might contain areas with naturally occurring radioactive materials, which will elevate background radiation levels.

9.0 QUALITY ASSURANCE/RECORDS

9.1 Quality Assurance

9.1.1 The health physics technician performing the survey shall ensure that this procedure is current.

9.2 Records

- 9.2.1 Documented information shall be legibly written in ink.
- 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
- 9.2.3 The health physics technician performing the survey shall review appropriate forms and any other applicable forms for accuracy and completeness.
- 9.2.4 Entries must be dated and initialed by the health physics technician performing the survey to be valid.
- 9.2.5 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

None

1.0 PURPOSE

This procedure provides the methods Cabrera Services, Inc. (CABRERA) uses in operation of air samplers and calculation of radioactive particulate activity in air sample. This procedure describes the methods used to calculate Derived Air Concentration (DAC) DAC-hour exposures to workers. Adherence to this procedure will provide reasonable assurance that the surveys performed have accurate and reproducible results.

2.0 APPLICABILITY

This procedure will be used by CABRERA personnel to operate air samplers during surveys and work activities at customer facilities, calculate, and record DAC-Hour exposures to workers. Air samples are performed when the average alpha and beta contamination on facility surfaces, equipment and waste packages exceed the contamination limits specified in Table 1 of the Radiation Protection Manual (RPM) and included as Attachment OP-002-03 of this procedure. Air monitoring shall be performed in areas where there exists potential to exceed 10 percent of any DAC.

3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

3.1 Precautions

Not Applicable

3.2 Limitations

Not Applicable

- 3.3 Requirements
 - 3.3.1 Air samplers should only be operated in temperatures between –4⁰ F to 122⁰ F.
 - 3.3.2 Air sampler inspections shall be performed by qualified Health Physics personnel.

4.0 REFERENCES

RSP Radiation Safety Program

AP-001 Record Retention

OP-021 Alpha-Beta Sample Counting Instrumentation

Reg Guide 8.25 Air sampling in the Workplace

• NUREG-1556 Consolidated Guidance About Material Licenses (Vol.11)

OP-002

5.0 DEFINITIONS AND ABBREVIATIONS

- 5.1 Restricted Area An area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.
- 5.2 Smear Sample Survey A survey technique using filter paper smears to determine quantities of alpha and beta emitting radioactive material which can be removed from facility surfaces and waste packages.
- 5.3 Air Sample Survey A survey technique which collects particulates from a known volume of air and determines the concentrations of radioactive materials associated with the airborne particulates.
- 5.4 Annual Limit on Intake (ALI) The annual limit on intake (ALI) of radioactive materials is the smaller amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year (40 hours per week for 50 weeks) that would result in a committed effective dose equivalent (CEDE) of 5 rem or a committed dose equivalent (CDE) of 50 rems to any individual organ or tissue.
- 5.5 Derived Air Concentration (DAC) Derived air concentration is the concentration of a given radionuclide in air which, if breathed by "reference man" for a working year (40 hours per week for 50 weeks) under the conditions of light work (inhalation rate of 1.2 cubic meters of air per hour), results in an air intake of one ALI.
- 5.6 DAC-Hour The product of the concentration of radioactive material in air (expressed as a multiple of the derived air concentration for each nuclide) and the time of exposure to that nuclide, in hours, 2000 DAC-Hours represents one ALI.
- 5.7 Airborne Radioactivity Area A room, enclosure or area in which the radioactive material is dispersed in the form of dusts, fumes, mists, particulates, vapors and the concentration of the dispersed radioactive materials in excess of:
 - 5.7.1 The derived air concentrations (DAC's) specified in Table 1, column 3 of Appendix B, Title 10 Part 20 of the Code of Federal Regulations, or
 - 5.7.2 Concentrations such that an individual present in the area without respiratory protective equipment could exceed, during the hours the individual is present in a week, an intake of 0.6 percent on the annual limit on intake (ALI) or 12 DAC-hrs.

6.0 EQUIPMENT

6.1 None

7.0 RESPONSIBILITIES

- 7.1 Project Manager (PM) the PM is responsible for ensuring that personnel assigned the task of air sampling and air sampling analysis are familiar with this procedure, adequately trained with the specific instrument being used to perform surveys.
- 7.2 Radiation Safety Officer (RSO) The RSO is responsible for monitoring compliance with this procedure and training personnel in the use of the air sampling and air sampling analysis. The RSO can also assist in the interpretation of the results obtained during surveys.
- 7.3 Radiological Field Supervisor (RFS) During field assignments, the RFS is responsible for ensuring that this procedure is implemented. When the RSO is not on site, the RFS will act as the RSO's duly authorized representative for radiological issues.
- 7.4 Health Physics Technicians (HPT) The HPT performing air sampling and air sampling analysis are responsible for knowing and complying with this procedure.

8.0 INSTRUCTIONS

- 8.1 Initial Preparation
 - 8.1.1 Select the air sampler to be used for the type of sample to be used and verify that the instrument has a currently valid calibration. If the work area contains radioiodine or tritium, contact the radiation safety officer for special sampling procedures before proceeding.
 - 8.1.1.1 Area air samples are normally collected with a low volume air sampler having normal airflow of 1 CFM to 5 CFM.
 - 8.1.1.2 Breathing zone air samples are normally collected using lapel air samplers, which have a normal airflow of 1 to 5 liters per minute.
 - 8.1.1.3 All air sampling devices shall be calibrated to ensure accurate sample volumes are collected. The frequency of calibration shall not exceed one (1) year.

- 8.1.2 Attach the air sampling head to the intake of the low volume sample pump or to the tygon tubing of the Lapel sampler.
- 8.1.3 Obtain the filter paper to be used in the sample and mark the backside of the filter with a unique number, which will represent the sample. During the collection and handling of air sample filter papers, caution must be used to prevent the samples from being contaminated by other radioactive materials.
- 8.1.4 Place the filter paper in the holder and position the sampler as indicated below.
 - 8.1.4.1 Area air samples are collected by placing the sample head at a distance of 3 to 6 feet above the floor and as close to the work area as practical. If there is airflow in the work area, the sampler should be placed "down wind" of the area where workers will be resuspending radioactive particulates into the workers atmosphere.
 - 8.1.4.2 Lapel air samples are collected from workers breathing zone. The sample head is attached to the shoulder of the worker with the sample head facing forward. The tygon tubing connecting the sample head to the pump is run down the back of the worker with the sample pump attached to the workers belt.

8.2 Collecting the sample

- 8.2.1 When the sample head is in position, start the sample pump and adjust the flow rate to the highest flow rate, which can be maintained without flow rate fluctuations.
- 8.2.2 Record the time the sample was started and the initial flow rate of the sample pump on Form OP-002-01, Air Sample Data Sheet.
- 8.2.3 If possible, identify the radionuclides, which will be encountered in the work area and record the radionuclides along with the DAC for each radionuclide in the space provided on the Air Sample Data sheet. If a mixture of radionuclides is present, the DAC used in the calculations of DAC-Hours will be the most restrictive concentration.
- 8.2.4 Collect the sample for the maximum time possible, which represents the exposure encountered by the worker.
- 8.2.5 At the end of the collection period, note the flow rate of the sample pump and record this flow rate and the time, which the sampling stopped on the Air Sample Data sheet.

CAUTION: Be sure not to remove activity from the sample surface. Handle the filter with care.

- 8.2.6 Remove the sample filter and place the filter in an individual envelope or poly bag to ensure no possibility of contamination by other sources of radioactivity.
- 8.2.7 Record the names of workers who were in the area and the time spent in the work area on the Air Sample Data sheet.
- 8.2.8 Determine the average sample flow rate by adding the initial sample flow rate and the final sample flow rate and dividing by 2. Record the average flow sample flow rate in the space provided on the Air Sample Data sheet.
- 8.2.9 Calculate the total air volume sampled by multiplying the average flow rate in cubic centimeters per minute by the total minutes the sampler operated using the indicated spaces on the Air Sample Data sheet.
- 8.3 Determining minimum detectable activity (MDA) During calculations or air concentrations in the following sections, the MDA for each analysis is calculated to determine the statistical significance of the calculated air concentrations.
 - 8.3.1 For each air concentration calculation (alpha and beta) in the following sections, calculate the MDA using the following formula:

MDA in
$$\mu Ci/cm^3 = \frac{k_{\alpha}^2}{T_{s+b}} + 2[k_{\alpha}]\sqrt{\frac{R_b}{T_b} + \frac{R_b}{T_{s+b}}}$$

$$(2.22 \times 10^6)(E)(V)$$

Where:

E = Counter efficiency in CPM/DPM

R_b = Background Count Rate in CPM

T_b = Background Counting Time in Minutes

T_{s+b} = Sample Counting Time in Minutes

V = Sample Volume in cm³

2.22X10⁶ = Disintergrations per minute per microCurie (DPM/uCi)

- $k_{\alpha} = 1.645$ for a confidence level of 95% and 1.96 for a confidence level of 99%
- 8.3.2 If the MDA is larger than 10% of the Derived Air Concentration, recount the background for a longer time and/or increase the sample count time to lower the MDA. (The maximum count time should not exceed 1 hour for background and 30 minutes for the sample). Enter the MDA for each air concentration calculated in the space provided on the Air Sample Data sheet.
- 8.4 Initial Air Sample Analysis The initial analysis of air sample provides the air concentrations for short-lived radionuclides and a first estimate of the long-lived air concentrations. In situations where there is a potential for worker intakes to exceed 40 DAC-Hours in a week or if the radionuclides of interest are short-lived, air samples should be available before work resumes the following day.
 - 8.4.1 Air particulate samples are to be analyzed as a minimum for gross alpha and gross beta activity using a Ludlum Model 2929 Dual Channel Scaler or equivalent.
 - 8.4.2 Place the air sample collection media in the sample counter with the upstream collection side toward the detector. Count the air sample and calculate the sample activity and record results on appropriate form(s).
 - 8.4.3 Record the Alpha and Beta sample DPM results in the Air Sample Data sheet.
 - 8.4.4 Calculate the alpha and beta air concentrations using the following formula. Adjustment due to alpha self absorption are made as appropriate.

Air Concentration
$$(\mu Ci/cc) = \frac{\alpha \text{ or } \beta \text{ DPM}}{(2.22 \times 10^6 \text{ DPM} / \mu Ci)(Sample Volume(cm}^3))}$$

- 8.4.5 Enter the alpha and beta air concentrations on the Air Sample Data sheet in the space provided for the initial air concentrations.
- NOTE: If the air sample concentration is greater than 10% of the DAC value, notify the RSO or duly authorized representative for further instructions.
 - 8.4.6 If the air concentration is less than 10 percent of the most restrictive DAC, no further analysis of the air sample is required. If the air

concentration exceeds 10% of the DAC concentration, proceed with the analysis in section 8.5.

- 8.5 Air sample analysis for long-lived radionuclides This analysis allows for decay of naturally occurring radionuclides and provides for correcting air concentrations for naturally occurring radionuclides.
 - 8.5.1 Air particulate samples are analyzed following 12 hour decay, and again at 72 hours if necessary to allow for decay of radon, for gross alpha and gross beta using a Ludium Model 2929 Dual Channel Scaler or equivalent.
 - 8.5.2 Place the air sample in the sample counter with the collection side toward the detector. Count the air sample and calculate the sample activity and record results on appropriate form(s).
 - 8.5.3 Record the Alpha and Beta sample DPM results in the Air Sample Data sheet.
 - 8.5.4 Calculate the alpha and beta air concentrations using the following formula. Adjustments due to self absorption are made as appropriate.

Air Concentration
$$(\mu Ci/cc) = \frac{\alpha \text{ or } \beta \text{ DPM}}{(2.22 \times 10^6 \text{ DPM} / \mu Ci)(Sample Volume(cm}^3))}$$

- 8.5.5 Enter the alpha and beta air concentrations on the Air Sample Data sheet in the space provided for the 12-hour decay concentrations. If the 12-hour decay air concentrations is below 10% of the DAC no further analysis is required.
- 8.5.6 If the 12-hour air concentration is above 10% percent of the DAC value, recount the air sample following 72 hours of decay from the time the sample was stopped. Calculate the air concentration using the formula in step 8.5.4 and record the air concentrations in the space provided for the 72-hour decay air concentration on the Air Sample Data sheet. If the 72-hour air concentration is below 10% of the DAC value, no further analysis is required.
- 8.5.7 If the air concentrations exceed 10% of the DAC values, notify the RSO or duly authorized representative for further instructions. Save the air sample for possible further analysis. For air samples, which

exceed 10% of the DAC values, an exposure is assigned to the workers residing in the area where the sample was taken.

- 8.6 Assignment of DAC-Hour exposures to workers
 - 8.6.1 For air samples which exceed 10% of the DAC values, calculate the workers DAC-Hour exposure using the following formula:

Exposure in DAC-Hours =
$$\frac{A \times B}{C}$$

Where:

A = Area or Lapel air sample concentration in uCi/cm³

B = Hours worker was in the calculated air concentration

C = DAC air concentration in uCi/cm³ from regulatory reference.

8.6.2 Enter the DAC-Hour exposure on the column provided on the Air Sample Data sheet. If respiratory protection was used during the exposure period, contact the RSO or duly authorized representative for the protection factor used to adjust DAC-Hour exposure.

9.0 QUALITY ASSURANCE/RECORDS

- 9.1 Quality Assurance
 - 9.1.1 The alpha and beta counter used to count air samples will be calibrated daily when in with a known radioactive source with activity traceable to the National Institute of Standards and Technology (NIST).
- 9.2 Records
 - 9.2.1 Documented information shall be legibly written in ink.
 - 9.2.2 Data shall not be obliterated by erasing, using white-out, or by any other means. Incorrect entries shall be corrected by striking a single line across the entry. The correction shall be entered, initialed, and dated.
 - 9.2.3 The health physics technician performing air sampling and analysis shall ensure that this procedure is the most current and approved revision.

- 9.2.4 The health physics technician performing air sampling and analysis shall review all applicable forms for accuracy and completeness.
- 9.2.5 Entries on and any other pertinent forms must be dated and initialed by the health physics technician performing the air sampling and analysis to be valid.
- 9.2.6 The RSO or duly authorized representative shall review any applicable completed forms. The review shall be for accuracy and completeness.

10.0 ATTACHMENTS

OP-002-01 Air Sample Data Sheet

OP-002-02 Daily Air Sample Record

OP-002-03 Contamination Limits

OP-002-01 Air Sample Data Sheet

Sample #	_	Date			
Description:					
Radionuclides:	DA	AC value:			
	DAC value:				
	D/	AC value:			
initial sample flow rate:	Time san	npler on:			
Final sample flow rate:	Time san	pier off:			
Average sample flow rate:	Total sam	ple time:	hours		
Total sample volume:	cm³				
Initial Air Concentration:					
Alpha =	μCl α/cm³	Beta =	μCi β/cm³		
MDA =	μCi α/cm³	MDA =	μCi β/cm³		
	 ·				
12 Hour Decay Air Concentratio	n:				
Alpha =	_μCi α/cm³	Beta =	μCl β/cm³		
MDA =	μCi α/cm³	MDA =	μCl β/cm³		
72 Hour Decay Concentration:			-		
Alpha =	μCi α/cm³	Beta =	μCi β/cm³		
MDA =	_μCi α/cm³	MDA =	μCi β/cm³		
Performed By:		Date:			
		. — 310.			

OP-002-02 Daily Air Sample Record

Worker Name	Sample Date	Final Count Date	Time In	Time out	Total time (Hrs.)	Concentration (uCi/cm ³)	DAC-Hour Exposure
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					·		
			-	eurskije e	: ·		Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Compan
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Contamination Limits from Table 1 of RPM

RADIGNUCLIDES	E-41 CONTA	LE SURFAGE MINATION:
	REMOVABLE	FIXED + REMOVABLE
Transuranics, Ra-226, Ra-228, Th-230, Pa-231, Ac-227, I-125, I-129	20	100
Th-Natural, Th-232, Sr-90, Ra-223 Ra-224, U-232, I-126, I-131, I-133	200	1000
U-Natural, U-235, U-238, and associated Decay products	1000	5000
Beta-Gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	1000	5000

Appendix G:

Instrumentation Calibration Certificates



GTS Instrument Services 2045 Route 286 Pittsburgh, PA 15239-2839 724/733-1900 Fax: 724/327-8189

CALIBRATION CERTIFICATE

This Certificate will be accompanied by Galibration Charts or Readings where applicable

CUSTOMER INFORMATION				INSTRUMENT INFORMATION			
Customer Name: GTS INSTRUMENT SERVICES Customer Address: 2045 Rt. 286 Pittsburgh, PA 15239 Customer P.O.# Work Order #		Model _ External	Instrument ManufacturerLud1um				
- Control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the cont	IN.	ISTRUMENT CAL	BRATION INFOR	MATION			
Instrument Range	Calibration Standard Value		Response After Calib.	Comment			
25	2.25K CPM 4.5K		10 uR/hr	All Calibrations Btn. + & - 10			
50	2.25K 9K		10 40	Battery: OK Mechanical Zero: OK			
250	0.05 mR/hr 0.1 0.2		52 100 190	Response: OK Reset: OK			
500	0.1	-	100	Audio: OK			
5000	0.4		1,000	Light: OK High Voltage = 718 Volts			
			2,000 3,950	1000 uR/hr = 225K CPM			
		STATEMENT	OF CERTIFICATI	ON			
Manufacturers to the National use of this instrument Calibrat	published operating Institute of Standard rument).	specifications. We fu s and Technology (W	rther certify that our	rior to shipment and that it met all of the Calibration Measurements are traceable for damage incurred during shipment or the above information is correct:			
Calibration Date: _ Next Calibration Du			Adminis	trative Coordinator Date			



GTS Instrument Services 2045 Route 286 Pittsburgh, PA 15239-2839 724/733-1900 Fax: 724/327-8189

09-07-00^(\$igned)

109-07-01

Calibration Date: _

Next Calibration Due:

CALIBRATION CERTIFICATE

This Certificate will be accompanied by Calibration Charts or Readings where applicable CUSTOMER INFORMATION INSTRUMENT INFORMATION GTS INSTRUMENT SERVICES Instrument Manufacturer Ludlum Customer Name: 2045 Rt. 286 Model _____Serial Number _ 94754 (312) Customer Address: Pittsburgh, PA 15239 External Probe(s)44-9 __ Serial # _ 150382 (456) Calibration Method _99Pulser s/n 101500 Customer P.O.# Tc s/n S1256 Work Order # Cs s/n 10263 200mCi INSTRUMENT CALIBRATION INFORMATION Instrument Response Calibration Instrument Before Callb. Standard Value After Calib. Range Comment X1 100 CPM 100 CPM All Calibrations Btn. + & - 10% 200 200 OK 400 400 Battery: X10 Mechanical Zero: 1K 1K 2K 2K 4K 4K Response: OK. X100 10K 10K Reset: OK 20K 20K 10 Speaker: OK 40K 40K 11 XIK 100K Alarm: OK 100K 200K 200K 14 High Voltage = 900 Volts 400K 400K I mR/hr = 3K CPM in 99 To Efficiency = 10.4% STATEMENT OF CERTIFICATION We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all of the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology (We are not responsible for damage incurred during shipment or use of this instrument). Instrument Calibrated by: == certify that the above information is correct:



GTS Instrument Services 2045 Route 286 Pittsburgh, PA 15239-2839 724/733-1900 Fax: 724/327-8189

CALIBRATION CERTIFICATE

CU	STOMER INFORM	MATION	INSTRUMENT INFORMATION			
Customer Name: GTS INSTRUMENT SERVICES Customer Address: 2045 Rt. 286 Pittsburgh, PA 15239		Instrument Manufacturer Ludlum Model 177 Serial Number 113563 External Probe(s) 44-9 Serial # 150396				
Customer P.O.# Work Order #			Calibrati	on Method 137 Pulser s/n 101500 90 Cs s/n 10263 200mCi 95 Tc s/n S1256		
	11	STRUMENT CALI	BRATION INFOR	MATION		
Instrument	Calibration	Instrument				
Range	Standard Value	Before Calib.	After Calib.	Comment		
х1	100 CPM		100 CPM	All Calibrations Btn. + & - 10		
	400		<u>200</u> 400	Battery: OK		
X10	1K		1K	Mechanical Zero: OK		
	2K ·		2K			
	4K		4K	Response: OK		
X100	10K		10K	Reset: OK		
	20K 40K		20K 40K	Speaker: OK		
XIX	100%					
AIK	100K 200K		100K 200K			
	400K		400K	High Voltage = 900 Volts		
1 1 1 1 1 1 1				I mR/hr = 3.2K CPM in Cs fi		
				Tc Efficiency = 10.4%		
·			•			
		STATEMENT C	OF CERTIFICATI	ON		
Manufacturers :	oublished operating nstitute of Standard	specifications. We fur	ther certify that our	rior to shipment and that it met all of the r Calibration Measurements are traceable e for damage incurred during shipment or		



Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

Passed Dielectric (HI-Pot) and Continuity Test

POST OFFICE BOX 810 PH. 915-235-5494 501 OAK STREET FAX NO. 915-235-4672 SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVIC	CES		ORDER NO	252317
Mfg. <u>Ludlum Measurem</u>	ents, Inc. Model	2929	Serial No. <u>/638</u> =	27
Mfg. <u>Ludium Measurem</u>	ents, Inc. Model	43-10-1	Serial No. <u>PR1713</u>	J22
Cal. Date 30-Aug-0	0 Cal Due Date	30-Aug-01 Co	al. Interval <u>1 Year</u> Meter	face <u>202-014</u>
Check mark 🗹 applies to applic	able instr. and/or detector IAV	V mfg. spec. T. <u>76</u>	F RH33_% AI	1 702.8 mm Hg
New Instrument Instrume	-	+-10% 10-20% Out of I	ol. Requiring Repair [Other-See comments
 ,	Window Operation			
Meter Zeroed	Alpha Sensitivity175	mV Beta Sensitivity	4 mV Beta Window5	60 mV
Callbrated in accordance w	,		cordance with LMI SOP 14.9 rev	 .
Instrument Volt Set 875			et with detector connected.	en en en en en en en en en en en en en e
	Ref./Inst	•	_	2000 V
	KOLUMISI	7		
COMMENTS:				
			•	
•				
Gamma Calibration: GM detectors positioned per	pendicular to source except for M 44-9 in which	h the front of probe faces source.		
	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER REA	DING*
Alpha Channel	100%			
Digital Readout	400K cpm		400958	
	40K cpm		40010 40102	· ·
	4K cpm		4008	
	400 cpm		401	
	40 cpm		40	
Beta/Gamma Channel	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER REAL	DING*
Digital Readout	400K cpm		400996	_
	40K cpm		40087	· · · · · · · · · · · · · · · · · · ·
	4K cpm		4005	
	400 cpm		401	- -
	40 cpm		40	·
*Uncertainty within ± 10% C.F. within:			<u> </u>	
Ludium Measurements, Inc. certifies that the	above instrument has been calibrated b	by standards traceable to the National Inc	stitute of Standards and Technology, or to	the calibration facilities of
other international Standards Organization in The calibration system conforms to the requir	ements of ANSI/NCSL 2540-1-1994 and A			ation License No. LO-1963
Reference Instruments and/or				
Cs-137 Gamma S/N 1162 G1	•			ulton Am-241 Be S/N T-304
✓ Alpha S/N Pu239 s/	<u>/n4337</u>	C14 s/nl659	[5] Other	Tc-99 s/n635/83
™ 500 S/N12103	6 Oscillosco	pe S/N	Multimeter S/N	61341135
Calibrated By: Commi	e Tomlin	son00	ite 30 aug 00	
Continued But	70	~	30,1	· · · · · · · · · · · · · · · · · · ·
Reviewed By:		U(te	<i></i>

This derificate shall not be reproduced except in full, without the written approval of Ludium Measurements, inc. FORM C25 12/29/1999



FORM C48 12/09/97

Designer and Manufacturer of Scientific and Industrial Instruments

LUDLUM MEASUREMENTS, INC.

POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR 171322					2		Orde	er#	252317
Custo	omer CAB	RERA SERVI	CES			Alpha	Input Sensitiv	ity	/75 m\
Cour	nter	2929	Serial No. 16	3827					<u>4</u> m\
	nt Time								50 mV
	er					Distance Sour	ce to Detect	or to	<i>t</i> 1.
0	·								7
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					CIY				TE-99
	igh	Вас	kground	Size	<u>155,824C</u> p1	n Size <u>15</u>	5,700cpm		14 300cpm
	oltage	Alpha 1	Beta	Alpha	Beta	Alpho	Belo .	Alpho	
	850	0	: 53	0	ברסוב	12259	482	6	8079
<u> </u>	875	0	62	0	125306	12491	. 387	15	8741
	900	0	<u>: 71</u>	0	:28765	/2232	429	17	9/64
	925	0	95	1	32/27	12289	554	10	9315
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	Cas Proportio	and detecto	r count rate dec	reased ≤ 10	0% afier 15 hour	etatic test using	a 30° cable		•
			r count rate dec		0% after 5 hours		- ,	alpha/beta	counter.
								- C.p. 10, 2010	
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Signo	ature	nnie	Toml	men			Date	30 a	ug oo

Serving The Nuclear Industry Since 1962 •

CALIBRATION CERTIFICATE



A Division of RSCS, Inc.

CUSTOMER NAME:

Cabrera Services, Inc. 809 Main Street

East Hartford, CT 06108

COMPANY CONTACT:

Jason Marsden PHONE: 860-289-1885

INSTRUMENT MAKE:

LUDLUM Model: 2221 Serial Number: 161581

PRECISION CHECK							
TEST 1	TEST 2	TEST 3	MEAN	SAT/UNSAT			
99.0	100.0	100.0	99.7	SAT			

ACCURACY CHECK						
SCALE	EXPOSURE RATE	AS FOUND	AS LEFT			
X1000	400.00 Kcpm 100.00 Kcpm	400.23 Kepm 99.89 Kepm	400.23 Kcpm 99.89 Kcpm			
X100	<u> </u>		39.99 Kcpm 9.97 Kcpm			
X10	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		3.99 Kcpm 1.00 Kcpm			
X1	400.00 cpm 100.00 cpm	1.00 Kcpm 399.00 cpm 99.00 cpm	399.00 cpm 99.00 cpm			

All readings are within +/- 10% unless otherwise noted All scale(s) were calibrated using a pulser Calibrated with 43-89 (010955) Efficiency with spacers for Sr/Y-90 = 0.1546 C/D (high voltage set at 820 Volts)

CALIBRATED BY:

QN: 09/14/00 EXPIRES ON: 03/14/01

This calibration was performed using a NIST Traceable radiation source, in conformance to MIL-STD 45662. RSCS New Eampahire Radioactive Material License Number: 381R, Cesium Calibration Source: Tech Ops Mod 773. Serial Number 58, Activity 112 millicuries on 9/9/92. RSCS recommends that their customers remit a check source with their meters for calibration. If supplied, the check source will be characterized at the time of calibration.

Radiation Safety & Control Services, Inc.

91 Portsmouth Avenue • Stratham, NH 03885-2468

1-800-525-8339 • (603) 778-2871 • Fax (603) 778-6879 • www.radsafety.com



Calibration Certificate

A Division of RSCS, Inc. Customer Name:

Cabrera Services, Inc.

809 Main Street

East Hartford, CT 06108

Company Contact: Instrument Make:

Curtis Hales

Ludlum

Model:2221

Phone: 718-298-8613

Serial Number: 161581

	Precision Check								
	Test 1	Test 2	Test 3	Mean	Sat/Unsat				
1	100	100	100	100 .	Sat				

	Accurac	y Check	
Scale	Exposure Rate	As Found	As Left
X1000	400.00 Kcpin	400.05 Kcpm	400.05 Kcpm
	100.00 Kcpm	99.93 Kcpm	99.93 Kcpm
X100	40.00 Kcpm	39.89 Kcpm	39.89 Kcpm
	10.00 Kcpm	9.96 Kcpm	9.96 Kcpm
X10	4.00 Kcpm	4.01 Kcpm	4.01 Kcpm
·	1.00 Kcpm	1.00 Kcpm	1.00 Kcpm
X 1	400.00 cpm	399.30 cpm	399.30 cpm
·	100.00 cpm	99.7 cpm	99.7 cpm

All readings within +/- 10% unless otherwise noted. All Scales were calibrated using a pulser.

Calibrated with a 43-89 probe (S/N 118277)

See attached sheets for Efficiency Plateaus. All efficiencies performed at 1cm.

Window Off, HV = 925 selected

Efficiencies:

Sr/Y-90 = 0.1252 Counts/Decay

Pu-239 = 0.1604 Counts/Decay

Calibrated By:

Date: 11/17/00

Expires On: 5/17/2001

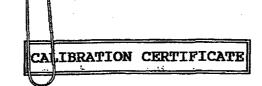
This calibration was performed using a NIST Traceable radiation source, in conformance to Mil.-STD 45862. RSCS New Hampshire Radioactive Material License Number: 381R; Cesium 137 Calibration Source: Tech Ops Model 773, Serial Number 58, Activity 112 millicuries on 09-09-92. RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and all applicable sections of 10 CFR 21.The Services provided on Cabrera Services (RMA # 2000-023) were provided in compliance with RSCS, Inc. Quality program: Radiation Protection Program, Rev 3 Dated 1/1/96.

Radiation Safety & Control Services, Inc.

91 Portsmouth Avenue • Stratham, NH 03885-2468

1-800-525-8339 • (603) 778-2871 • Fax (603) 778-6879 • www.radsafety.com







A Division of RSCS, Inc.

CUSTOMER NAME:

Cabrera Services, Inc. 809 Main Street

East Hartford, CT 06108

COMPANY CONTACT:

Jason Marsden PHONE: 860-289-1885

INSTRUMENT MAKE:

LUDLUM Model: 2221 Serial Number: 163673

PRECISION CHECK						
TEST 1	TEST 2	TEST 3	MEAN	SAT/UNSAT		
100.0	100.0	99.0	99.7	SAT		

	ACCURAC	CURACY CHECK				
SCALE	EXPOSURE RATE	AS FOUND	AS LEFT			
X1000	400.00 Kcpm	398.72 Kcpm	398.72 Kcpm			
	100.00 Kcpm	99.73 Kcpm	99.73 Kcpm			
X100	40.00 Kcpm	39.88 Kcpm	39.88 Kcpm			
	10.00 Kcpm	9.98 Kcpm	9.98 Kcpm			
X10	4.00 Kcpm	3.99 Kcpm	3.99 Kcpm			
	1.00 Kcpm	0.99 Kcpm	0.99 Kcpm			
X1	400.00 cpm	399.00 cpm	399.00 cpm			
	100.00 cpm	100.00 cpm	100.00 cpm			

All readings are within +/- 10% unless otherwise noted All scale(s) were calibrated using a pulser Calibrated with 43-89 (S/N 171386) Efficiency with spacers for Sr/Y-90 = 0.2234 C/D(high voltage set to 800 Volts)

CALIBRATED BY:

ON: 09/14/00 EXPIRES ON: 03/14/01

This calibration was performed using a NIST Traceable radiation source, in conformance to MIL-STD 45662. RSCS New Bampshire Radioactive Material License Mumber: 381R, Cesium Calibration Source: Tech Ops Mod 773. Serial Number 58, Activity #12 milliouries on 9/9/92. RSCS recommends that their customers remit a check source with their meters for calibration. If supplied, the check source will be characterized at the time of calibration.

Radiation Safety & Control Services, Inc.

91 Portsmouth Avenue • Stratham, NH 03885-2468

1-800-525-8339 • (603) 778-2871 • Fax (603) 778-6879 • www.radsafety.com



Designer and Manufacturer Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

POST OFFICE BOX 810 PH. 915-235-5494

501 OAK STREET FAX NO. 915-235-4672 SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SE	ERVICES				ORDE	R NO25	7129/252367
Mfg. Ludium Measu	rements, Inc. Mo	del	2221		Serial No.	163673	
Mfg. Ludlum Measu		del			_	PR 171386	
Cal. Date21-D				Cal inte			
Check mark Vapplies to ap						20 % Ali	
New instrument Instru	•						· · •
,	. —						
	· ☑ Meter Zeroed ☑ Reset ck.			nd Subtract peration] Input Sens. Line Geotropism	earity
√ F/S Resp. ck √ Audio.ck.	Alarm Setting			tin. Volt)		g Geoliopism	
Calibrated in accordance						14.9 rev 12/19/89.	
Instrument Volt Set	,				7	breshold	= 4 m
W HV Readout (2 points	-	98					2000 V
	5,					·	
COMMENTS: Instrument calibrate High voltage set wit Overload checked but Firmware version 261	h detector conne not set.			·			
				•			
4					•		
. å	•						
Gamma Calbration: GM detectors positioned	d perpendicular to source except for	M 44-9 in which the front of p	robe faces source.				
		ERENCE		RUMENT REC		NSTRUMENT	
RANGE/MULTII		POINT	"AS F	OUND READ	ING" N	METER READING	G*
X 1000		om		400	- -	400	
<u>X 1000</u> X 100	100 K cr 40 K cr		-	100 400		100 400	
X 100	10 K cr			100		100	
X 10	4 K cr		_	40		400	
X_10	1 K cr			KV		<i>10</i> 0	
. <u>XI</u>	400 cp	m		400		<i>9</i> 00	
X1	100 cr	om'		<u> Jou</u>			····
·				· · · · · · · · · · · · · · · · · · ·	 -		
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*Uncertainty within ± 1						ge(s) Calibrated	
REFERENCE	INSTRUMENT	INSTRUMENT		FERENCE	INSTRUM		TRUMENT
CAL. POINT	RECEIVED	METER READING*	log	AL. POINT	RECEIVE	D ME	TER READING*
Readout 400 K cpm	40046 6	40046 00	Scale _	500 K cpm		<u> </u>	.SOOK
<u>40 K cpm</u>	<u>4005</u>	4085) -	50 K cpm	50	<u> </u>	SOK
4 K cpm	<u>-400</u> %	400	-	5 K cpm		<u> </u>	500
400 cpm 40 cpm			-	500 cpm			.,, 00
tudium Measurements, Inc. certifies that other international Standards Organizal The calibration system conforms to the real Reference Instruments and Cs-137 Gamma S/N 1162	ion members, or hove been de equirements of ANSI/NCSL 2540 d/or Sources: G112 M565 505	itved from accepted value 1-1-1994 and ANSI N323-19 T1008 T879	es of natural phys	ical constants or hav	e been derived b State of To	y the railo type of call exas Calibration Lic	ration techniques.
Alpha S/N	Z	Beta S/NTc99	Ni-EV, Sr90/Y9	0#4016	Ofher		
√ m 500 S/N	0648	Oscilloscope S/N	•		Multimeter S	/N <u>617</u>	30074
Calibrated By:	arting			Date	21-Dec	-00	•
Reviewed By: Thands	46-			Date 2	7 Deco		
This certificate shall not be reproduce FORM C22A 12/29/1999	d except in full, without the wri	tien approval of Ludium I	Measurements, Inc			ric (Hi-Pot) and Cor	tinuity Test



Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

POST OFFICE BOX 810 PH. 915-235-5494

501 OAK STREET

FAX NO. 915-235-4672

SWEETWATER, TEXAS 79556, U.S.A.

COMMENTS: Firmware version: 390096 Alpha Threshold: 120mv. Beta Threshold: 3.5mv Beta Window: 30mv. Overload checked but not set. High Voltage set with the detector disconnected. Gamma Calibration: GM detectors positioned perpendicular to source except for M 449 in which the front of probe faces source. RANGE/MULTIPLIER REFERENCE NSTRUMENT REC'D NSTRUMENT REC'D NETER READING* A1000 800kcpm A1000 200kcpm A1000 200kcpm A1000 200kcpm A100 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1000 A1			DER NO				<u></u>		CABRERA SERV	CUSTOM
Mig	,		. 162420	_ Serial No		2224-1	del	nents, Inc M	Ludium Measuren	Mfa.
Col. Date		·	ARI71381	Serial No		43-89	iel	nents. Inc. M	Ludium Measuren	•
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Alarm Settling ck.		-		•		_				-
Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.8 rev 12/19/89. Instrument Volt Set		opism	✓ Geotropi							
Threshold										
MY Readout (2 points) Ref./Inst. See	m		Threshold				_			
COMMENTS: Firmware version: 39096 Alpha Threshold: 120mv. Beta Threshold: 3.5mv Beta Window: 30mv. Overload checked but not set. Righ Voltage set with the detector disconnected. Samma Calibration: SM delactors postioned perpendicular is sounts except for M 449 is which the total of grobe faces sourts. REFERENCE INSTRUMENT RECTO INSTRUMENT METER READING* Al000 800kcpm 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ Company 2AQ C			Dial Ratio		•	•	•			
Page	v	1000	/		V Ref./inst	500	/	Ref./instSe	Readout (2 points)	Δ <u>V</u> H.
### Alpha Threshold: 120mv Beta Threshold: 3.5mv Beta Window: 30mv. Overload checked but not set. High Voltage set with the detector disconnected. ###################################		_								
Beta Threshold: 3.5mv Beta Window: 30mv. Overload checked but not set. Righ Voltage set with the detector disconnected. Gamma Calibration: SM detectors positioned perpendicular to source except for M 44-9 in which the foot of grote faces source. REFERENCE RANGE/MULTIPLIER CAL POINT REFERENCE X1000 800kcpm 24-0 X1000 200kcpm 24-0 X1000 200kcpm 24-0 X100 200kcpm 24-0 X100 200kcpm 24-0 X100 200kcpm 24-0 X100 200kcpm 24-0 X100 200kcpm 24-0 X100 200kcpm 24-0 X100 200kcpm 24-0 X100 200kcpm 24-0 X10 200kcpm 24-0 X10 200kcpm 24-0 X10 200kcpm 24-0 X10 200kcpm 24-0 X10 200kcpm 24-0 X10 200kcpm 24-0 X10 X10 X10 X10 X10 X10 X10 X10 X10 X1										
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This certificate shall not be reproduced except in full, without the written approval of Ludium Measurements, Inc. FORM CZZA 12/20/1999 Passed Dielectric (Hi-Pot) and Continuity Te				.,,)					ve -	Reviewe

Model Number: 2221 Serial Number: 97841 Client: Cabrera Probe No.: PSL-4 Serial Number: NA PO #: 01-218/01-209	Automated Engineering & Electronic Services 165 Deer Run Ridge RD. Kingston Tennessee 37763 1-423-376-0229 Fax 1-423-376-0229 www.nadprobe-sees.com										
Model Number: 2221 Serial Number: 97841 Client: Cabrera											
Ratemeter/Scalar Serial Number: 97841 Client: Cabrera Probe No.: PSL-4 Serial Number: 97841 Client: Client: Cabrera O1-218/01-209 O1-218/01-209											
Model Number: 2221 Serial Number: 97841 Client : Cabrera PO #: 01-216/01-209											
Probe No.: PSL-4 Serial Number; NA PO #: 01-218/01-209 The subject instrument was calibrated to the indicated specifications using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constraints. This document certifies that the instrument met the following specifications upon its return to the submitter. Upon receipt the instrument was found: Within Specs. AEES Inc. calibrations control system complies to the guides lines of ANSI N323-1997, ANSI/NCSL Z540-1-1994 and Mil Std 45662A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANAIGOCAL Date Scale / Test As Found Varianc As Left Value Calib. Value CPM Crits Crits Crits Range Value Value 0.1 Max Value 0.1 Max Tol. 1 100 100 0.00 100 0.00 0.1 1775 12 178 188 10 100 100 1000 0.00 1000 0.00 0.1 1775 18 682 684 100 100 100 0.00 1000 0.00 0.0 0.1 1800 25 978 963 100 400 4000 0.00 10000 0.00 0.1 1825 49 1339 1290 100 100 10000 0.00 10000 0.00 0.1 1825 1828 100 400 4000 0.00 40000 0.00 0.1 1875 189 1895 1828 100 205 2262 2057 1825 1820 Recommended HV ② 1800 voits Recommended HV ② 1800 voits	J										
and Technology or to accepted values of natural physical constraints. This document certifies that the instrument met the following specifications upon its return to the submitter. Upon receipt the instrument was found: Within Specs. AEES Inc. calibrations control system complies to the guides lines of ANSI N323-1997, ANSI/NCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANSI/OCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANSI/OCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANSI/OCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANSI/OCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANSI/OCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANSI/OCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANSI/OCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANSI/OCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN ANSI/OCSL Z54O-1-1994 and Mill Std 45652A Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN Electronic files are identified by: MDL_SN_DATE_PROBE MDL_PROBE SN Electronic files are ide											
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Scale / Test											
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NA 5 1000 5000 0.00 5000 0.00 2000 2015 2016											
ERR 10 1000 NA -1.00 NA -1.00 2500 NA NA											
PROS-100 Amplifier Calibrations Procedures Test SN. Due Date. M&TE SN. Due Date.											
PROS-200 Counters Calibrations Corn Port tested: No Geotropic Tested: Yes											
PROS-300 Support Circuits Tests Repairs performed: No Thermo Tested: ᅱ											
PROS-400 — Not Required Response Tests: Yes Functional Tests: Yes MP-1 132 8-20-2001 PROS-500 Geotropic Tests Speaker Testsed: Yes Timer Tested: Yes ESV 17231 2-07-2002 Temperature in Deg. F	8.										
PROS-800 Probe Calibrations Battery Level: 5.2 Alpha threshold NA Scope 2850 6-28-2001 Pressure in mm/hg 74	₹.										
PROS-800 — Not Required Flow Rate (cc/min) 109+ Beta threshold 50 Relative Humidity 5											
Source SN. DPM Cal Due Date Source SN. DPM Cal Due Date Source SN. DPM Cal Due Date											
	- 1										
	ı										
Flexible source provided by GTS Duratek TC-99 129682 5832 6-1-94	-										
Remarks: Source Geometry during plateaus was 0.5 inches from mylar surface. Flow rate set at 100 cc/min											
Allow 30 minutes purge time at 100+ comin to assure sufficient purge, then operate flow at 100 comin.											
Not UsedifNo/NA = Not Req. or need	ded										
Performed By: Rate: 16-2001											
Reviewed By: Taymuse Date: 3-16-01	الــــــــــــــــــــــــــــــــــــ										

File Name format: model_sn_date_(probe model_probe sn)

APPENDIX C WASTE CHARACTERIZATION FORMS WASTE SHIPPING MANIFESTS WASTE STORAGE LOG

RADIOACTIVE WASTE PROFILE RECORD (EC-0230)

Revision 2

Generator 1	Name: U.S. Army Corps of Engineers ; Generator #/Waste Stream #: 4037-01; Volume of Waste Material: 1200F3
Contractor	Name: Franklin Env. Services, Inc. ;Waste Stream Name: Demolition Rubble ;Delivery Date:~ 10/30/00 & 11/3/00
Check appr	ropriate boxes: Licensed Y⊠ N□; NORM/NARM □; LLRW ☑; MW □; MW Treated □; MW Needing Treatment □
	PCB Radioactive Y ☐ N ☒; PCB Mixed Waste Y ☐ N ☒; DOE ☐
Original So	ubmission: Y N; Revision # 0 ; Date of Revision 09/25/00
Name & Ti	tile of Person Completing Form: Greg Copeland VP Operations/Zeherie Zhaqrus Env. gle 1/1/60 Phone: 801-595-0239
	TOMER INFORMATION:
waste	IERAL: Please read carefully and complete this form for one waste stream. This information will be used to determine how to properly manage the e. Should there be any questions while completing this form, contact Envirocare at (801) 532-1330. WASTES CANNOT BE ACCEPTED ENVIROCARE UNLESS THIS FORM IS COMPLETED. If a category does not apply, please indicate.
1.	GENERATOR INFORMATION
EPA	ID# "Not Applicable" EPA Hazardous Waste Number(3) (if applicable): "Not Applicable"
Maili	ing Address: USACE, Baltimore District, Attn: CENAB-EN-H, 10 South Howard Street, Baltimore, MD 21201-1715
Phon	te: <u>(410) 962-9184</u> Fax: <u>(410) 962-4972</u>
Local	tion of Material (City, ST): Queens (New York City), New York
Gene	erator Contact: Hans B. Honerlah Title: Health Physicist
· Maili	ing Address (if different from above): Same as above
Phon	ie: Same as above the "/7/00 Fax: Same as above the "/7/00
B. WAS	STE PHYSICAL PROPERTIES (If you have questions about the remaining sections, please contact Envirocare at (801) 532-1330.)
1.	PHYSICAL DATA (Indicate percentage of material that will pass through the following grid sizes, e.g., 12" 100%, 4" 96%, 1" 74%, 1/4" 50%, 1/40" 30%, 1/200", 5%.)
	12"90%
2.	DESCRIPTION: Color Varies Odor Varies 4" %
	Liquid Solid 99% Sludge Powder/Dust 1% 1" 5 %
	1/4"5%
3.	DENSITY RANGE: (Indicate dimensions) 20 60 S.G. 1b./th ² 1b./yd ³ 1/40" %
4.	GENERAL CHARACTERISTICS (% OF EACH)
	Soil Bullding Debris 75 Rubble4 Pipe Scale Tailings Process Waste Concrete 19 Plastic/Resin 1
٠	Other constituents and approximate % contribution of each:1% polymer cellulose-based water absorbent
5.	MOISTURE CONTENT: (Use Std. Proctor Method ASTM D-698, for soil or soil-like materials.)
	• Optimum Moisture Content: % @ Max Dry Density (lb/ft³):
	Average Moisture Content: 98.5% gla "hloc
	The waste material must not exceed 3 percentage points above optimum moisture upon arrival at Envirocare's disposal site. Moisture Content Range: / % - 2 % "///
	DESCRIPTION OF WASTE: (Please complete "Attachment B.6, Physical Properties." This attachment must describe the waste with respect to it physical composition and characteristics).

RAI	OIOLOGICA	L EVALUATIO	ON.	•,	*		4			
1	license assu lived isotop	mes that short-liv	ed decay	products of s sted below an	pecified isoto; d do not requi	pes are prese re manifestir	nt in concen	trations equal to	the parent.	ith the waste. Envirocare's Consequently, these shortent, use "Attachment C.1,
	Isoto	pes Con	centration (pCi/g	_	Weighted Av per Containe (pCi/g)		Isotopes		ntration Rang (pCi/g)	Weighted Avg. per Container (pCi/g)
	a. Sr-S	90 0	to _	2,500	50	d.			to	
	b. <u>H</u> -	3 0	to	487	10	c.			to	
	c. <u>C-1</u>	14 0	to	96	10					
2. 0-9	A⊠ N□									evel Radioactive Waste n line 3 of page 1.
3.	Y⊠ N□	LICENSED M. license?	ATERIA	L: Is the was	te material list	ted or include	d on an acti	ive Nuclear Reg	gulatory Com	mission or Agreement State
		(If Yes) TYPE				•	∕laterial [];	By-Produ	it⊠; NOF	um 🔲; narm 🔲
		LICENSING A	GENCY	: Nuclear R	legulatory Con	nmission	,			•
4.	У□ И⊠	U-233, Pu-236,	Pu-238, I ification"	u-239, Pu-24	0, Ru-241, Pu	-242, Pu-243	or Pu-244?	If YES, please	complete, si	ellowing radionuclides: gn and attach the "SNM ation must be included
CH	EMICAL AI	ND HAZARDOU	IS CHAI	RACTERIST	ICS		. *			
1.		TION AND HIS								
	Available p commingle land-dispos applicable a information	rocess knowledg d with the waste; al prohibition or analytical results	e of the w a list of a hazardou involving ty Data S	raste. The basiny and all apparents of the compositions in the compositions associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated associated a	ils of hazardor plicable EPA I sions, extension lion of the was ted with the w	us waste dete Hazardous W ons, exemptionste. Attach a aste. If a cat	rminations. aste Numbe ons, effective ny product in gory on this	A list of the chars, current or for dates, variance information or to save the waste Profile	emicals and normer; and, a less, or delisting reatment stand Record does	waste was generated, naterials used in or list of any and all applicable gs. Attach the most recent or lards. Attach any product not apply, describe why it
	Please desc	ribe the history, a	end inclu	ie the followi	ng:					
	Y N⊠	Was this waste thereafter?	mixed, tro	ated, neutrali	zed, solidified	l, commingle	d, dried, or o	otherwise proce	ssed upon ger	neration or at any time
	Y NX	Has this waste b	ecn trans	ported or othe	erwise remove	d from the lo	cation or sit	e where it was	originally gen	crated?
	Y NX	Was this waste CFR 261?	derived fi	om (or is the	waste a residu	e of) the trea	tment, stora	ge, and/or dispo	sal of hazard	ous waste defined by 40
•	Y N	Has this materia	ıl been tro	eated at any ti	me to meet an	y applicable	treatment sta	andard?		
2.	LIST ALL	KNOWN AND			CAL COMPO	NENTS OR			HARACTE	
	a. Listed d. Cyanic g. Pestici j. Explos m. Organi p. Ignital s. Antim v. Nickel y. Alcoho bb. Cadmi	HW des ides sives fics onle only			b. "Derived e. Sulfides h. Herbicide k. Pyrophor n. Phenolics q. Corrosive t. Beryllium w. Thallium z. Arsenic cc. Chromius	ies s		c. f. i. l. c. e. u.	Toxic Dioxins PCBs** Solvents Infectious Reactive Copper Vanadium Barium Lead	

Other Known or Possible Materials or Chemicals: Zinc

ee. Mercury

hh. Benzene

kk. Fluoride

qq. Asbestos

nn. Chelating Agents

Silver

Nitrite

Pathogenic

mm. Fuel

Selenium

Nitrate

oo. Biological

Oil

^{••} If the waste is regulated by TSCA, please complete, sign, and attach the applicable PCB/Radioactive or PCB/Mixed Waste certification form.

3.		OR TOXICITY CHARACTERIS I licate range or worst-case results).	TC. (Please transcribe results or	the blank spaces provided. Attach
	Metals (check one):	(mg/kg) or 🛛 TCLP (mg/l)	Organics (check one):	otal (mg/kg) or 🔀 TCLP (mg/l)
	Arsenic ND	Lead 0.773	Volatile organics	ND
	Barium ND	Mercury 0.0065	Semi-vol. organics	ND
	Cadmium ND	Scienium ND	Organochlor, Pest.	ND
	Chromium ND	Silver ND	Chlor, Herbieides	
		Zinc <u>24.5</u>		
4.	ANALYTICAL RESULTS For sheets if needed).	•	(Please transcribe results on the	blank spaces provided. Attach additional
	Soil pH 7.5	Paint Filter Pass Liquids Test (Pass/Fail)	Cyanide 0.051 Released (mg/kg)	Sulfide ND Released (mg/kg)
5.	IGNITABILITY (40 CFR 26)	1.21[a][2],[4].)		
	Flash Point ≥ 60	₹□ ℃⊠	Is the waste a RCR	A oxidizer? Y N
6.	CHEMICAL COMPOSITION complete, if necessary.)	N (List all known chemical compon	ents and check the applicable co	contration dimensions. Use attachments to
	Chemical Component	Concentration	Chemical Component	Concentration
	Total PCBs	1.77 % ☐ mg/kg ⊠	· · · · · · · · · · · · · · · · · · ·	% mg/kg
		%	-	%
			Halogenic Organic Compounds (HOC) (S	ım of
	**************************************	% 🔲 mg/kg 🗍	the list of HOCs.)	% 🗍 mg/kg 🗍
7.	Hazardous Waste Numbers and wastewaters), treatment standar exemptions, exclusions, variant formatted as below.	I information with respect to the was rds and concentrations or technology ices, extension, allowances, etc. If ac	te's subcategory (e.g., low mercu (e.g. 5.7 mg/l selenium extract of Iditional space is needed, provide shility Group Treatability Sta Concentrations of	r Technology Extensions or Exclusions (List 40 CFR reference)
				Y N
				Y□ N□
qual state AN	ified laboratory for the following ments. Attach all analytical rest ALYSES, CHECK WITH ENV	g analytical parameters unless nonap ults and QA/QC documentation. (C. TROCARE AND LABORATORY	plicability of the analysis for the AUTION: PRIOR TO ARRAN REGARDING UTAH LABOR	ATORY CERTIFICATIONS.
FO	RALL WASTE TYPES: CHE	MICAL ANALYSIS: Soil pH (904	5), Paint Filter Liquids Test (909	5); Reactivity (cyanide and sulfide).
1.	MINIMUM ADDITIONAL A	NALYTICAL REQUIRED FOR:		
	a. Non-RCRA Waste (Non M	fixed Waste, i.e. LLRW, NORM): 1	CLP including the 32 organics, t	metals, and zinc (Zn).
		show why the waste is hazardous, an		
	(1) TOX (Total Organic I	Halides SW-846 9020/9022) or volati	le & semi-volatile organics (824	0+8270, required if TOX >200 mg/kg)
	•	ion-based treatment standards		
	•••	Cyanide, SW-846 9010 or 9012, regu	ired if reactive cyanide >20 mg/k	g

E.

2.	REQUIRED RADIOLOGICAL ANALYSES: Please obtain suffi in the waste. Analyze all waste streams by gamma spectroscopy.	icient samples to adequately deter	mine a range and weighted average of activity
•	Plutonium, Thorium, or other non-gamma emitting nuclides are predetermine the concentration of these additional contaminants in the Item C.4.	sent in the material, the waste mu	st be analyzed using radiochemistry to
3.	PRE-SHIPMENT SAMPLES OF WASTE TO ENVIROCARE	•	•
	Once permission has been obtained from Envirocare, please sen 2000 form must be included with the sample containers. These s parameter tolerances and may be analyzed for additional parameters unbreakable glass container via United Parcel Post (UPS) or Federal	samples will be used to establish t s. Send about two pounds (one lit	he waste's incoming shipment acceptance
	Envirocare of Utah, Inc., Attn: Sample Control, Tooele County, Int (For Federal Express use Zip Code 84083). Phone: (435) 884-015		34029
4.	LABORATORY CERTIFICATION INFORMATION. Please in	ndicate below which of the follow	ring categories applies to your laboratory data.
	a. Note analytical data that is to represent mixed waste must b the data in item C.1. must be from a Utah-certified laborato		EPA. All radiological data used to support
	☑ UTAH CERTIFIED. The laboratory holds a current certificat Health insofar as such official certifications are given. For an the laboratory's current certification letter for each parameter as	ialytical work done by Utah-cer	tified laboratories, please provide a copy of
	GENERATOR'S STATE CERTIFICATION. The laborator generator's State insofar as such official certifications are given		the applicable chemical parameters from the
	☐ GENERATOR'S STATE LABORATORY REQUIREMEN agency for chemical laboratories.	TS. The laboratory meets the req	uirements of the generator's State or cognizant
	If using a non-Utah certified laboratory, briefly describe the gendetermination that the laboratory used meets those requirement method specific, or involve CLP or other QA data packages. Nanalytical results may not be necessary to complete Section B,	s, especially in terms of whether t lote: When process or project kno	he requirements are parameter specific.
	b. For analytical work done by laboratories which are not Uta	h-Certified, please provide the f	ollowing information:
	State or Other Agency Contact Person	Generator's State	Telephone Number
	Lab Contact Person	Laboratory's State	Telephone Number
		Laboratory 5 Dutto	Totopione Pattiner
CE	ERTIFICATION		
GE	ENERATOR'S CERTIFICATION OF REPRESENTATIVE SAMI	PLES, ANALYTICAL RESULT	S FROM QUALIFIED LABORATORIES.

F.

USE OF APPROVED ANALYTICAL AND SAMPLING METHODS, AND ARRANGEMENTS FOR TREATMENT OR NON-PROHIBITED DISPOSAL. I certify that samples representative of the waste described in this profile were or shall be obtained using state- and EPA-approved sampling methods. I also certify that where necessary those representative samples were or shall be provided to Envirocare and to qualified laboratories for the analytical results reported herein. I further certify that the waste described in this record is not prohibited from land disposal in 40 CFR 268 (unless prior arrangements are made for treatment at Envirocare) and that all applicable treatment standards are clearly indicated on this form. I also certify that the information provided on this form is complete, true and correct and is accurately supported and documented by any laboratory testing as required by Envirocare of Utah, Inc. I sertify that the results of any said testing have been submitted to Envirocare of Utah, Inc.

Generator's Signature: (Sign for the above certification)

No. of			
Pages:		4	
Analyding thi	s Cove	T Sheet)	

Date:

7 Nov 2000



From: Hans Honerlah Office: CENAB-EN-HI Fax No.: 410-962-9184 Phone No: 410-962-4972

CORPS OF ENGINEERS

To: Greg Copeland	Office: Zhagris
Fax No.: 801-595-8805	Phone No.: 801-595-0239

MEMO:

Greg '

Attached is is the updated attachment (including PCB statement) for the St Albans waste stream. Moisture range 1 to 2 %. If you need anything please give me a call Thanks

Hans Honerlah

P.01

DRIVEN BY A VISION to be the best!

WASTE PROFILE PACKAGE 1 SAINT ALBANS VERTERANS ADMINISTRATION EXTENDED CARE CENTER (VAECC) Remediation Waste

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SITE BACKGROUND

The VAECC facility located in Queens, NY currently maintains a US Nuclear Regulatory Commission (NRC) Possession Only" Byproduct Material License No 31-02892-06, Docket 030-34751, Control No. 125705. The License was issued for residual Strontium 90(Sr-90) contamination resulting from laboratory research performed in the early 1960s. Conditions of the license require that several areas of the VAECC be secured from routine access and placed under radiological control due to elevated levels of Sr-90 surface contamination and bulk material concentrations. The license also requires the Decontamination and Decommissioning (D&D) of the facility.

Stone & Webster, on behalf of the USAACE-NYD is currently conducting D&D activities to support the termination of the NRC license. The waste presented in this Waste Profile represents wastes generated from this D&D activity. Waste will primarily consist of miscellaneous debris (equipment, glassware, furniture, piping, floor tiles), personal protective equipment (PPE), concrete and soil.

There has been his franctional liquids, associated with the former Laboratory activities, encountered during the Danie Activity.

WASTE PROFILE

This profile characterizes the demolition debris generated during the decommissioning at the St. Albans VA facility. Approximately 1200 cubic feet of waste will be generated. The debris will packaged into 55 gallon drums and transported via box truck to the disposal facility.

RADIOLOGICAL

Numerous samples for Sr-90 were collected from in-situ materials for volumetric Sr-90 analysis. The results of the sampling indicate that Sr-90 is present in bulk materials at concentrations up to 2500 pCi/g. The characterization survey conducted in preparation for the decommissioning plan also included the use of field instruments and wipe samples. The field instruments were utilized to determine the area of Sr-90 contamination. The wipe samples were utilized to determine the presence of other isotopes typically utilized in a nuclear medicine clinic and the potential for removable contamination. Wipe samples for H-3 and C-14 were analyzed by LSC and wipe samples for Sr-90 were analyzed for gross beta. Table 1 summarizes the maximum results in dpm/100 cm² for the direct reading instruments and wipe samples. The only notable contamination was in the form of fixed Sr-90 detected by the field instrument, all other isotopes were below NRC "Acceptable License Termination Screening Values" published in the Federal Register Volume 63, Number 222, dated 18 November 1998.

Table 1 - Summary of Maximum Characterization Results

Sr-90 (field instrument)	2,898,917
Sr-90 (wipe sample)	2,746
H-3 (wipe sample)	25,413
C-14 (wipe sample)	5,000

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The maximum range for the isotopes listed in the profile were calculated utilizing the information from Table 1 with the following assumptions and equations;

a) The field instrument utilized for Sr-90 was capable of detecting the beta energies associated with Sr-90 and Y-90. The rule of thumb for range of beta particles is equal to; R = [E_{max}/2]/ (g/cm³). The E_{max} is associated with Y-90 (2.28 MeV). The density of concrete is 2.35 g/cm³. The max range for the beta energy is 2.5 cm. Utilizing a more conservative range of 1 cm to calculate the volumetric concentration can be calculated with the following equation:

EQ 1:

$$\frac{pCi}{g} = \frac{dpm}{cm^3} \bullet density \frac{cm^3}{g} \bullet conversion 1 \left(\frac{1m}{60s}\right) \bullet consversio n2(27.03)$$

dpm/cm³ = dpm/100cm² field reading and 1cm depth assumption concrete density = 0.426 cm³/g conversion 1 - converts dpm to dps or becquerel conversion 2 - converts becquerel to pCi

Sr-90 Field Instrument Conversion

$$5,738 \frac{pCi}{g} = 2,989,917 \frac{dpm}{100 cm^3} \bullet 0.426 \frac{cm^3}{g} \bullet \left(\frac{1m}{60s}\right) \bullet (27.03)$$

b) The Sr-90, H-3 and C-14 wipes can be converted utilizing equation 1. The conservative assumptions for input into the equation are identified below:

dpm/cm³ = dpm/100cm² wipe area and 1mm depth assumption concrete density = 0.426 cm³/g

Sr-90 Wipe Sample Conversion

$$52.7 \frac{pCi}{g} = 2,746 \frac{dpm}{10cm^3} \bullet 0.426 \frac{cm^3}{g} \bullet \left(\frac{1m}{60s}\right) \bullet (27.03)$$

H-3 Wipe Sample Conversion

$$487 \frac{pCi}{g} = 25,413 \frac{dpm}{10cm^3} \bullet 0.426 \frac{cm^3}{g} \bullet \left(\frac{1m}{60s}\right) \bullet (27.03)$$

C-14 Wipe Sample Conversion

$$96\frac{pCi}{g} = 5,000\frac{dpm}{10cm^3} \bullet 0.426\frac{cm^3}{g} \bullet \left(\frac{1m}{60s}\right) \bullet (27.03)$$



CHEMISTRY

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One composite sample was originally collected for TCLP analysis in addition to other waste disposal The composite sample consisted of wall and ceiling material; concrete, wood, glass and piping. The TCLP result indicated a cadmium exceedance of TCLP Regulatory Level. The result was 3.78 mg/l, which exceeded the regulatory limit of 1.0 mg/l, this exceedance indicates a hazardous waste. Eleven additional grab samples, of materials originally included in the composite sample (plus tile, paint, were collected for TCLP cadmium analysis, to determine the actual source of the cadmium. These samples, however, did not detect cadmium. The laboratory also reextracted the original composite sample and reanalyzed for TCLP cadmium, to determine if a laboratory error may have occurred. The result, however, indicated a cadmium presence 15 mg/l TCLP. All individual components of the waste stream have been analyzed for cadmium and no cadmium has been detected. Therefore, the original composite sample is not considered a representative sample of the waste stream, and the waste should not be considered a hazardous waste. The samples were analyzed for PCB's to determine that there were no elevated levels above regulatory guidelines. There were several small transformers located within the facility and the facility being occupied by the U.S. Navy may have utilized a paint that could have contained small quantities of PCB's. All PCB results indicated trace quantities well below regulatory limits.

The waste also contains asbestos containing materials including; vinyl asbestos tiles, mastic and transite board.

TRANSPORTATION AND DISPOSAL

Transportation of the waste will be conducted by Franklin Environmental. Their "Carrier Safety Rating" as of September 19, 2000 is satisfactory. The waste will be disposed of at Envirocare in Utah, under the USACE existing contract with the facility (DACW41-98-D-9003).

SHIPPING DOCUMENTATION AND CONTAINER LABELING

Attached are the waste profiles for demolition debris. Based upon current field scanning result it is anticipated that this waste will be disposed of as a Surface Contaminated Object (SCO) waste. The waste manifests will be prepared in accordance with the profiles. A USACE representative will be required to sign the manifests on the day of shipment.

The material will be labeled and placarded in accordance with the shipping documentation.



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11-02-5000 Td: 07

PRE-SHIPMENT SAMPLE PROFILE RECORD 12/15/94 Generator Name: U.S. Army Corps of Engineers; Generator #/Waste Stream #: 4032-01; Volume of Waste Material: 2.138 ft3; Contractor Name: Franklin Environmental Services, Inc.; Waste Stream Name: Demolition Rubble ; Delivery Date: 12/13/00; Check appropriate boxes: Licensed Y: Non-Licensed ; NORM ; LARW Y; MW Treated ; MW Needing Treatment ; FUSRAP ; 11e.(2) _ Original Submission: X Y; N: Revision # ___; Date of Revision __ Name & Title of Person Completing Form: Robert Tess, Project Manager, Franklin Environmental Services, Inc. ***SPECIFIC APPROVAL BY AN ENVIROCARE PROJECT MANAGER <u>MUST</u> BE OBTAINED BEFORE <u>ANY</u> SAMPLES ARE SHIPPED TO THE ENVIROCARE SITE. UNAUTHORIZED SAMPLES THAT ARE DELIVERED WILL BE REFUSED. *** This form is to be completed by the generator's chemical safety officer or equivalent and should accompany pre-shipment samples sent to Envirocare. Please read carefully and complete this form describing the samples sent for one waste stream. This information will be used to determine how to properly and safely manage, analyze and dispose of your samples. This form should not be enclosed in the sample containers or package but should accompany the samples, attached to the sample package, if possible. Should you have any questions while completing this form, contact Envirocare at (801) 532-1330. PRE-SHIPMENT SAMPLES CANNOT BE ANALYZED FOR THE INCOMING-SHIPMENT FINGERPRINT PARAMETERS OR OTHER ANALYSES UNLESS THIS FORM IS COMPLETED. Please mail this form with the samples to: Envirocare of Utah, Inc., Attn: Sample Control, Tooele county US I-80 Exit 49, Clive, Utah 84029 1. CHEMICAL/SAFETY OFFICER INFORMATION 3. SAMPLE COLLECTION Chemical/Safety Officer: Marc Bianco Sample Collection Contact Person __ Marc Bianco Title of Chemical/Safety Officer: Site OC/Safety Manager Site QC/Safety Manager Title of Contact Person _ Phone (718)298-8613 Firm Stone & Webster Engineering Phone (718)298-8613 Firm Stone & Webster Engineering 2. Sample Return Street Address (Do not use P.O. Box Number): 4. Waste Stream Name Demolition Rubble Stone & Webster c/o St. Alban's VAECC EPA Hazardous Waste Number(s) None-179th Street and Linden Boulevard, Jamaica, NY 11425 Y N Is this a sample of Mixed Waste? Indicate (Y or N) the expected or possible analytical results, characteristics or components of any sample of this waste stream below: PLEASE CIRCLE "Y" or "N" Y N Soil Ph > 12.5 Y N Soil pH < 2 YN Volatile Organics Y N Alkaline Materials Y N Concrete Y N Oxidizing Agents Y N Reducing Agents YN Dissolved Metals Y N Organic Halides Y N Shock Sensitive Y N Cyanides YN Air Reactive Y N Sulfides Y N Free Liquids Y N Pyrophoric Y N Acids Y N Caustic Materials YN Organic Compounds YN Inorganic Compounds YN Water Reactive YN PCBs Y N Explosives YN Solvents Y N Infectious Y N Corrosives Y N Flash Point <60 C Y N Corrosive Materials Y N Reactive Materials Y N Manganese Y N Copper Y N Mercury Y N 3H, 14C, 129 or 99Tc Y N Others Asbestos 6. List major isotopes of concern and activities: Sr-90 = 2,500 pCi/g max; C-14 = 96 pCi/g max; H-47 pCi/g max 7. During analyses, our analysts will subject these samples to analytical environments including: heat, cold, stirring, shock impacts, caustics, acids (including nitric and glacial acetic), salt solutions (including potassium iodide, potassium nitrate, sodium thiosulfate, sodium sulfite), starch, iodine, and buffered pH solutions. Please list the associated hazards and safety precautions to be employed when analyzing any sample of this waste stream. GENERATOR'S CERTIFICATION OF REPRESENTATIVE SAMPLES: I certify that samples representative of the waste described above are provided to Envirocare of Utah, Inc., for pre-shipment analyses. GENERATOR'S AUTHORIZATION THAT SAMPLES MAY BE ANALYZED SAFELY: I further authorize that these samples may be safely analyzed using the precautions described in 6. above.

Generator's Safety Officer's Signature Title Civil Engineer Date 12 Dec 00 (Sign for the above certifications and authorizations.) On Behalf of USACE FUBS Program

for disposal within 3 months of sample delivery.

GENERATOR'S AUTHORIZATION AND CERTIFICATION TO RETURN SAMPLES AND PRIOR TO OR FOLLOWING ANALYSES: I hereby authorize that Envirocare of Utah, Inc., may return these samples to the address in 2. above prior to or following analysis and prior to disposal. I hereby certify that the generator and generator's applicable associates in this project understand that pre-shipment samples may be returned if wastes are not sent to Envirocare

PRESHIPMENT SAMPLE AUTHORIZATION

To: Rob Tess

From: Bret Rogers, Envirocare

Date: 12/12/00

PLEASE SEND 5 PRESHIPMENT SAMPLES FOR PROJECT

NUMBER: 4032-01

WASTE STREAM NAME: Demolition Rubble

TO: ENVIROCARE OF UTAH, INC. US I-80, EXIT 49 TOOELE COUNTY, CLIVE, UT 84029 84083 -IF USING FEDEX

SITE PH: (435) 884-0155

SEND THE FOLLOWING FORMS, AS A MINIMUM, WITH THE SAMPLE: (1). A <u>COMPLETED</u> EC-2000 FORM, (2). A STANDARD SAMPLE CHAIN-OF-CUSTODY, (3). ATTACH A COPY OF THIS AUTHORIZATION TO THE SHIPPING CONTAINER ALONG WITH THE OTHER FORMS REQUESTED.

THE SAMPLE RETURN ADDRESS <u>MUST</u> BE COMPLETED ON THE EC-2000 FORM IN ITEM #2. THE SAMPLES WILL NOT BE ACCEPTED WITHOUT THIS ADDRESS.



SHIPPING CHECKLIST

The following checklist has been developed to assist generators in shipping radioactive waste to Envirocare of Utah (Envirocare). This information is also contained in the "Waste Acceptance Guidelines" document available on Envirocare's website at www.envirocareutah.com.

Scheduling: Must be established at least 5 working days in advance of requested arrival date
A "Notice to Transport" has been issued by Envirocare for the Waste Profile. Submitted "5 Working Day Advanced Shipment Notification" form to request shipping schedule. Email form to sstory@envirocareutah.com or fax to (435) 884-3549 Shipping schedule has been confirmed by Envirocare. Envirocare's Shipping & Receiving Scheduler: Sandra Story, (435) 884-0155 ext. 1131
Advanced Manifesting: Must be submitted prior to releasing each shipment/conveyance
 Manifested information is consistent with the approved Waste Profile. Verify that all manifested radionuclides are listed in item C.1 of the approved Waste Profile and that manifested concentrations do not exceed the approved ranges. Verified consignee information on manifests (see below). Consignee: Envirocare of Utah, Inc. Contact: Shipping and Receiving Clive Disposal Site Phone No.: (435) 884-0155
Shipment Paperwork and Inspection
 □ The original shipping paperwork/manifests plus four copies accompany each shipment (conveyance). Only one copy of the 540/541 is required with the shipment if the electronically signed copy is submitted via email 3 days prior to the shipment arrival date. □ If applicable, a completed and signed copy of the SNM Exemption Certification form has been included with the shipping papers. □ Containers have been inspected and comply with DOT's strong, tight packaging requirements. □ Containers do not contain free standing liquids.

NOTICE

"RADIOACTIVE MATERIAL EXCEPTED PACKAGE / LIMITED QUANTITY OF MATERIAL"

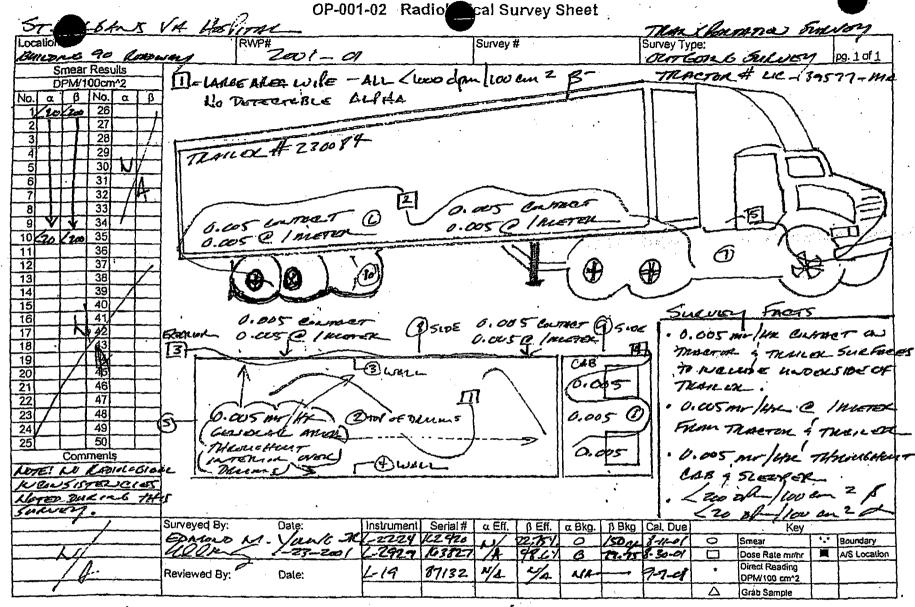
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RADIOACTIVE MATERIAL

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13 To Recipients Sample Control Phone 1935, 884-0155	Saturniary Ballicrosy Association Statement
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CLIVE State UT ZEP 84083	Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor Tensi Declared Victor
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Questions? Call 1-800-Go-FedEx* (800-463-3339) Visit our Web alto at www.federc.com	8 Release Signature Special Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company of the Company
Thy undergrades Alfolds your seyme our time monities countries on this baset, of this Alfolds modifies our consent Services Unides, including harmon that first our facility.	By signating your auctivation as on of bloom this philosomer voltame electroning a signature and appear to be demonstry and trabibility and translations in contrastly considered chairs.

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FORM 549 En	virocare of Utah, Inc. /E	8. SHIPPI U.S. ATRIY C CENAE-EN-	ER - NAME AND F. korps Of Englosen	ACILITY			Si	HIPME 40	NT LD, NUMBER 32-01-002		ORM 640 AND 540A	PAGE 1 0	F 7 PAGE(S) 24 PAGE(S)		er on all continuation
WASTE MANIFEST		10 South Ho	Ward Street ID 21201-1715				. -		COLLECTOR				None PAGE(8)	4032-01-002	
SHIPPING PAPER	· · ·	USER PERMIT NUMBER			SHIPME 4032-01	NT NUMBE	R,		SENERATOR TYPE Specify G	8. CC	ONSIGNEE - Name a	nd Facility Address		CONTACT Shipping and Rocal	ving
EMERGENCY TELEPHONE NUMBER (Include Area Code) \$00-426-8078		CONTACT					1	ELEPH	ONE NUMBER	CHYS	rocare of Utsh, Inc. Disposel Site			I	ER(Include Area Code)
ORGANIZATION Fracidin Environmental Services	· · · · · · · · · · · · · · · · · · ·	Mr. Hans	Honerleh				. (4	410-9	Area Code) 12-9184	Clive	utato 80, Edt 49 s, UT 84029			(435)884-0155.	
2 18 THIS AN "EXCLUSIVE USE" SHIPMENT? 3. TOTAL NUMBER OF PACKAGES IDENTIFIE	ED		ER Name and Ad Arompental Servic al Road						NUMBER	8IGN	IATURE - Authorized	l consignee acknowle	olying waste receipt	DATE	
X NO	> 103	Wrentham, 8	MA 02093					HIPPIN 1/23/0	G DATE	774.1	to and the that the bird		CERTIFICATION	described performed man	ked and tabeled and a
4. DOES EPA REGULATED YES EPA MANIFEST NUMBER WASTE REGUIRUNG A		CONTACT Robe	ert Teso				76	ELEPH ncticle	ONE NUMBER Area Code) 18-8878	in prop certifies disposs	er condition for trans; a that the materials er at as described in eco	orizion according lo a cizzalfied, package ordance with the requ	the applicable regulati d, marked, and labeled dramants of 10 CFR Pa	described, packaged, mar ons of the Department of 1 and are in proper condition ats 20 and 61, or equivalents	Transportation. This also for transportation are not state regulations.
MANIFEST ACCOMPANY X NO THIS SHIPMENT? If Yes, provide Manifest Number >		SIGNATURE	- Authorized carri	1511	•	•	1 -	ATE		M	PORTED SIGNATUR	E	TITLE		STAB
11. LLS DEPARTMENT OF TRANSPORTATION DESCRIPTION	7		ulth T	olor	uld					رين	BEHAFO	Create	PROJECT 1		24 7210
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper stripping name, lazard class, UN ID number, and any additional information	12. DOT LABEL "RADIOACTIVE"	TRANSPORT INDEX	PHYS CHEM	14. SICAL AND ICAL FORM			٠,	DADE	15. VIDUAL NUCLIDES		TOTAL PA	16.° CKAGE ACTIVITY MCI	LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA			C-14	H-3		Sr-90		2.3510E-01	8.3540E-03	NA ·	245. LBS; 7.35 FT3	001
Redicactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA			C-14	H3		Sr-90		1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	002
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	. •		C-14	Нэ		Sr-90		1.1759E-01	3.1780E-03	ÑA	145. LBS; 7.35 FT3	003
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA			C-14	Н3		Sr-90		1.1759E-01	3.1780E-03	NA	145, LBS; 7.35 FT3	004
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA.	Solid /NA			C-14	H-3		Sr-90		1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	005
Radioactive material, excepted package-limited quantity of meterial, 7, UN2910	NA NA	NA .	Solid /NA			C-14	H-3		Sr-90		1.1759E-01	3.1780E-03	NA	145, LBS; 7.35 FT3	006
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA '	Solid /NA			C-14	Н-3		Sr-90		2.3510E-01	8.3540E-03	NA .	246, LBS; 7.35 FT3	007
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA			C-14	H-3		Sr-80		2.3510E-01	B.3540E-03	NA	245, LBS; 7.35 FT3	008
FOR CONSIGNEE USE ONLY	Record Waste Descr	iption Inade	quate	20. TERM	S AND CO HAZARD	NOTTON TAM BUDG	RIALS	Gener	dor represents & wa	rrents th	est Warle Meterial	is (or)is r	ot a hazardous weste s	is defined in 40 CFR 251. opriate kind-diaposal restr	Where the material is
<u> </u>	Contamination or Les	akage Detec	ted	<u> </u>	certificati	jou es teáni	red by 40	O CFR	268.1,	a separa	tte and completed ha	cardous waste manife	est enough was the appu		action licinos sucho.
	Unexpected Exposur	e Rates Det	ected	8.	TITLE; (Upon eccep detions her	tence et t	the disp	osal site by Environ on transfer from Gen	ere of UI	tah, inc., and all appro and be vested in Envir	prists regulatory aut	horides, title to the Wa	ste Material which conform	ns to Generator's
<u> </u>	Labels, Markings, etc		9 ·	C.	WASTE	MATERIAL	Genera	ior rep	elnement bos etnesen	s that all	date out forth in this	UNIFORM LOW-LEY	ÆL RADIDACTIVE WA	STE MANIFEST) are true	and correct in
_	Container Integrity In	adequate		_	sii tesbe	cts and in e	ccordanc	co with	all shogcapia goveru	vnocted i	laws, rules, regulation	s and Envirocers of U	Ash, inc.'s facility licen	10 .	
	Other , No Violations Detect	ad an Hile At	ntamant.	D.	INDEMN Babildy n	IFICATION BRUITS from	Genera the failure	e of the	nes to indemnify Ern Waste Material to o	orgam p	of Utah, Inc., its office In all material respect	rs, employees and a to the data supplied	pents against all losses on the (UNIFORM LO	and liability whatsoover it N-LEVEL RADIOACTIVE	Such losses or WASTE
	NO AIOISTOUS DEISCL	49 QN UNIS SI	upment.		MANUFE	⇒1'') OL 4 gJ J	र शासीताल	नव स्थाउ	to meet the standard	as presa	moso by the Departm	at of Transportation	or any governmental as	ency having jurisdiction o	ver such matters.

FORM 640 (10-96)



KITE: Hamese Brek GROWD - 0.005 mr/me_

OP-001

CABRERA SERVICES, INC.

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UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc. 8.

MANIFEST NUMBER (Use this number on all continuation pages) 4032-01-002

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U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any stiditional information)	12. DOT LABEL TRADIDACTIVE	13, TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		ING RADIO	15. IVIDUAL INUCLIDES	TOTAL PAG	16. KAGE ACTIVITY mCl	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	8.3540E-03	NA	FT3	011
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	012
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Soild /NA	C-14	H-3	Sr-90	2.3510E-01	8.3540E-03	NA	245. LBS; 7.35 FT3	014
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245, LBS; 7.35 FT3	015
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03 .	NA	245, LBS; 7.35 FT3	016
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545, LBS; 7.35 FT3	018
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA .	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	5.3540E-03	NA	245, LBS; 7.35 FT3	020
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Soild /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	022
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	024
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	8.3540E-03	NA	245, LBS; 7.35 FT3	026
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245, LBS; 7.35 FT3	030
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	031
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	3r-90	2.3510E-01	8.3540E-03	NA	245, LBS; 7.35 FT3	032
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA :	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	5.3540E-03	NA	245. LBS; 7.35 FT3	033
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid MA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	034
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	н-э	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	037
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	ÑĀ	645, LBS; 7,35 FT3	043
Radioactive material, excepted package-limited quantity of material, 7, UN2910 FORM 640A (10-99)	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA NA	545. LBS; 7.35 FT3	044

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc.

MANIFEST NUMBER
(Use this number on all continuation pages)
4032-01-002

PAGE 3 OF 7 F

		Offic	Pring Paper (CUNTIF	NUALIOR	٧)				•	PAGE 3 O	F 7 PAGES
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information.	12. DOT LABEL "RADIDACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		INI RADIO	15. DIVIDUAL ONUCLIDES	TOTAL PAG	16. :KAGE ACTIVITY mCl	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	G-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	045
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	- C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	052
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid INA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	053
Radioactive material, excepted package-limited quantity of material, 7, UN2910	· NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	FT3	054
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	065
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	056
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA ·	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	FT3	058
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	059
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	B.3540E-03	NA	245. LBS; 7.35 FT3	061
Redioactive material, excepted package-limited quantity of material, 7, UN2910	, NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3610E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	062
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA :	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	5.3540E-03	NA	245, LBS; 7.35 FT3	063
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid iNA	C-14	H-3	Sr-90	2.3510E-01	5.3540E-03	NA	245. LBS; 7.35 FT3	064
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	8.3540E-03	NA	245. LBS; 7.35 FT3	065
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245, LBS; 7.35 FT3	066
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid INA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245, LBS; 7.35 FT3	068
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	246. LBS; 7.35 FT3	069.
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	5.3540E-03	NA	245. LBS; 7.35 FT3	071
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	074

FORM 540A (10-95)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc.

MANIFEST NUMBER (Use this number on all conlinuation pages) 4032-01-002

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GE 4 OF 7 PAGES

		SHII	PPING PAPER (CON	INUATION)					•	PAGE 4 01	7 PAGES
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard classi, UN ID number, and any additional information	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		INDIV	6. IDUAL IUCLIDES	TOTAL PAC	16, KAGE ACTIVITY mCI	17. LSA/SCO CLASS	18, TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14 H	1-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	076
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA.	NA	Solid /NA	C-14 1	1-3	Sr-90	7.0448E-01	1.9040E-02	NA -	645. LBS; 7.35 FT3	078
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14 I	1-3	Sr-90	2.3510E-01	8.3540E-03	NA	245. LBS; 7.35 FT3	088
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Salid /NA	C-14 I	1-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	093
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14 I	1-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	094
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Soild /NA		1-3	Sr-90	2.3510E-01	8.3540E-03	NA	245. LBS; 7.35 FT3	102
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	1-3	Sr-90	2.3510E-01	B.3540E-03	NA	245. LBS; 7.35 FT3	103
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14 F	1-3	Sr-90	2.3510E-01	B.3540E-03	NA	245. LBS; 7.35 FT3	108-
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14 I	1-3	Sr-90	2.36105-01	5.3540E-03	NA	245. LBS; 7.35 FT3	110
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14 F	1-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	112
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14 F	1-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	113
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA -	NA	Solid /NA	C-14 F	1-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	119
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Salid INA	C-14 F	13	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	123
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid INA	C-14	1-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	124
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	G-14 F	1-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	125
Radioactive material, excepted package-limited quantity of material, 7, UN2910	ÑĀ	NA	Solid /NA	G-14 I	1-3	Sr-90	3.5224E-01	9.5200E-03	NÁ.	345. LBS; 7.35 FT3	126
Radicactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14 F	1-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	128
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14 I	1-3	Sr-90	1.1759E-01	3.1780E-03	NA .	145. LBS; 7.35 FT3	129

FORM 540A (10-88)

UNIFORM LOW-LEVEL RADIOACTIVE **WASTE MANIFEST** SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc.

MANIFEST NUMBER (Use this number on all continuation Pages) 4032-01-002

		SHII	PPING PAPER (CONT	INUATION	4)	•		t w		PAGE 6 CI	7 PAGES
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shapping name, hezard class, UN to number, and any edictional information	12, DOT LABEL "RADIDACTIVE"	18, TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		INI RADI	15. DIVIDUAL ONUCLIDES	TOTAL PAG	16. KAGE ACTIVITY mCl	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	FT3	139
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	140
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	143
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid MA	G-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 F13	145
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	150
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	Н-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	163
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	Н-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	167
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	168
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LB9; 7.35 FT3	170
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	171
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.6200E-03	NA	345. LBS; 7.35 FT3	172
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	174
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	181
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	НЭ	Sr-90	3.5224E-01	9.5200E-03	NA	345, LBS; 7.35 FT3	182
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	189
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3,5224E-01	9.5200E-03	NA	345, LBS; 7.35 FT3	192
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NÅ	C-14	H-3	Sr-90.	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	195
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	198

FORM 540A (10-98)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc. 8. MANIFEST N

MANIFEST NUMBER
(Use this number on all continuation pages)
4032-01-002

IGE '6 OF 7 PAGE

U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN 10 number, and any additional information	12. DOT LABEL "RADIOACTIVE"	TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		IND RADIO	15. IVIDUAL DNUCLIDES		18. KAGE ACTIVITY INCI	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19, IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA .	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.8040E-02	NA .	645, LBS; 7.35 FT3	205
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	645. LBS; 7.35 FT3	208
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	9r-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	236
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545, LBS; 7.35 FT3	238
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	Н-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	244
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545, LBS; 7.35 FT3	248
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NĄ	NA	Solid /NA	C-14	Н-3	Sr-90	5.8608E-01	1.5840E-02	NA	545, LBS; 7.35 FT3	256
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	258
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA .	146. LBS; 7.35 FT3	279
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA .	FT3 ,	281
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	,NA	445. LBS; 7.35 FT3	282
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	289
Radiosctive material, excepted package-limited quantity of material, 7, UN2910	. NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	290
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA .	Solid INA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	291
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445, LB9; 7.35 FT3	292
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1769E-01	3.1780E-03	NA	145, LBS; 7.35 FT3	296
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	298
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	. NA	445. LBS; 7.35 FT3	307

FORM 540A (10-95)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc. 8.

MANIFEST NUMBER
. (Use this number on all continuation pages)
4032-01-002

	อกแ	PPING PAPER (CONTIN	UATIO	V)					PAGE 7 OF	F 7. PAGES
12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		IND# RADIO	15. ADUAL RUCLIDES	· TOTAL PAC	16. KAGE ACTIVITY mCl	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
NA	NA .	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145, LBS; 7.35 FT3	308
NA NA	NA .	Solid /NA	C-14-	11-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345, LBS; 7.35 FT3	310
NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	8.5200E-03	NA	345. LBS; 7.35 FT3	311
NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	8,5200E-03	NA	345. LBS; 7.35 FT3	312
NA	NA	Solid /NA	C-14	НЗ	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	313
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	DOT LABEL "RADIOACTIVE" NA NA NA NA	12. DOT LABEL TRANSPORT INDEX NA NA NA NA NA NA NA NA NA NA NA NA	12. 13. 14. DOT LABEL TRANSPORT PHYSICAL AND CHEMICAL FORM NA NA Solid /NA NA NA Solid /NA NA NA Solid /NA NA NA Solid /NA NA NA Solid /NA NA NA Solid /NA	12. DOT LABEL TRANSPORT RADIOACTIVE TRANSPORT INDEX NA NA NA NA Solid /NA C-14 NA NA NA NA Solid /NA C-14 NA NA NA NA NA Solid /NA C-14	DOT LABEL	12	12. TRAISPORT PHYSICAL AND CHEMICAL FORM: NIDMIDUAL RIDDIVIDUAL FORM: NIDMIDUAL RIDDIVIDUAL FORM: NIDMIDUAL FO	12. IT IS INDICATED TRANSPORT PHYSICIA AND ROBIN ROBINGUIDES TOTAL PACKAGE ACTIVITY NING NING NING NING NING NING NING NIN	12. DOT LABEL TRANSPORT PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL AND PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIAL PHYSIA	12. 13. 14. 15. 15. 16. TOTAL WEIGHT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT PROJECT P

FORM 540A (10-96)

FORM 541 Envirocare of Utah, Inc. 2. MANIFEST NUMBER PECIAL NUCLEAR MATERIAL (GRAMS) NUMBER OF PACKAGES/ DISPOSAL CONTAINERS 4032-01-002 NET WASTE NET WASTE WEIGHT U-233 U-235 TOTAL UNIFORM LOW-LEVEL RADIOACTIVE 3. PAGE 1 OF 24 PAGE(S) 21.63 kg 13335.B **WASTE MANIFEST** 103 ·MD NP NP 4. SHIPPER NAME 757.05 tm 14.70 U.S. Army Corps Of Engineers CONTAINER AND WASTE DESCRIPTION ALL NUCLIDES **SOURCE** TA.00 L129 TRITTUN Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste 3.4523E+01 4.8320E+00 4.9320E+00 MBa NP NP NA SHIPMENT ID NUMBER (kgs) 4032-01-002 9.3307E-01 1.33302-01 1.3330F-01 anCi NP (tons) NA DISPOSAL CONTAINER DESCRIPTION WASTE DESCRIPTION FOR 15. RADIOLOGICAL DESCRIPTION CLASSIFI PHYSICAL DESCRIPTION 14. CHEMICAL DESCRIPTION CATION -SURFACE 8 WASTE 12 APPROXIMATE 13 INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT SURFACE CONTAMINATION CONTAINER AND WASTE WASTE **BOLIDIFICATION** WEIGHT Stable AU-Class A M8g/100 cm2 IDENTIFICATION CONTAINER VOLUME CONTAINE RADIATION DESCRIPTOR VOLUME(S) IN OR STABILIZATION CHEMICAL FORM WEIGHT LEVEL (See Note 2 CONTAINER MEDIA CHELATING AGENTI CHELATING 1 instable & Note 2A) B-Class B C-Class C GENERATOR ID NUMBER(S) (See Note 1 & Note 1A) (See Note 3) ACENT mSv/hr mram/hr ALPHA RADIONLICLIDES pCligm 1.00000E+01 1.00000E+01 5.00000E+01 3.3559E-02 3.3559E-02 1.6798E-01 9.0700E-04 9.0700E-04 4.5400E-03 AS 29.39-H MONE/NP 004/1 NA 3.3400E-66 0.21 111.13 <8.0000E-08 0.20 H-3 Sr-90 NP 2.3510E-01 6,3540E-03 7.35 0.12 <8.000E-03 2.0000E+02 7.36 Subtotal 2.3510E-01 6.3540E-03 Total 4.5400E-04 4.5400E-04 2.2700E-03 1.6798E-02 1.6798E-02 8.3990E-02 1.00000E+01 1.00000E+01 5.00000E+01 39-H NONE/NP 002/1 H-3 Sr-90 85.77 <8.0000F-04 3.3400E-06 0.21 0.20 NP 1.1759E-01 3.1780E-03 Subtotal 7.35 0.07 <8.000E-03 2 0000E+02 7.35 1.1759E-01 3.1780E-03 Total 1.00000E+01 1.6798E-02 4.5400E-04 3946 NONE/NE C-14 003/1 NA 3.3400E-06 1.00000E+01 4.5400E-04 2.2700E-03 0.21 85.77 <8.0000E-03 H-3 Sr-90 0.20 NP 1.1759E-01 3,1780E-03 2.0000E+02 Subtotal 7.35 0.07 <8.000E-03 7.35 Total 1.1759E-01 3.1780E-03 NOTE 1: Container Description Codes. For containers waste requiring disposal in approved structural over-packs the manerical code must be followed by "-OP." Note (A: Bulk Packaging Description Codes NOTE 2: Wasto Descriptor Codes. (Choose up to three which predominate by volume.) Note 2A: Specific Weste Description Note 3: Solidification and Stabilization Media Codes. (Choose up to note a: Solicitication and Stabilization Rodia Codes. (Chocas up to three Milch Predominate by volume) For media meeting disposal site shruchural stability requirements, the numerical code must be followed by "-S" and the media vendor and brand rame must also be identified in item 13. Code 100-NOME REQUIRED thoose all applicable codes.) oppe one code as may be modicable.) 20. Charcoal 29. Demolition Rubble 38. Evaporator Bottoms/Studges/ A Goodele 21. Inchrenator Ash 30. Cation ion-exchange Media 22 841 31. Anion fort-exchange Media 32. Mixed Bed fort-exchange Media 39, Compactible Traish Dewatered Solid 9 Demiceraliza R Intermeda . Metal Box 10. Gas Cylinder 40, Noncompactible Trash Combustible Non-combustible Plastic Orum or Pell 11. Bulk, Unpackaged Waste D Roll-off 33. Contaminated Equipment 34. Organic Liquid (except oil) 41. Animai Carcass
42. Biological Material (except Solidification 12. Unpackaged Components 90. Coment 94, Vinyl Ester Styrens Matel Dam or Pall 25. Acusous Liquid 13. High Integrity Container 99, Other, Describe Motel Tank or Lines 26. Filter Media 35. Glassware or Labrage solmal cercass) Air Filtration Filters 91. Concrete 27. Mechanical Filter in Hern 13, or . Sealed Source/Device (encapsulation 92. Bitumen Concrete Tank or Liner 19, Other, Describe in Rem 6, 43. Activated Material additional page 28. EPA or State 37. Paint or Plating 59, Other, Describe in item 11, 93. Vinyl Chloride 100. None Required or additional page Fiberglass Tank or Liner Hipparrious

FORM 541 (10-98)

FORM 841A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

3. PAGE 2 OF 24 PAGE(S)

	DISPOSAL COM	iranye-magai	OID POSE	CONTAINE	R AND WAS	ITE DESCR	IPTION (CONTINU	JATION)	WASTE DESCRIPTION	ALL PAR DE ALL PAR DE	de luie ver e			PAGE 2 OF 2	4 F / (O)	
	DISTURNECO	· ·	OF TON	1			 	PHYSICAL DESCR	WASTE DESCRIPTE	I 14. CHEMICAL DE	E TYPE IN C		6. RADIOLOGICA	DESCRIPTION		IEWASTE CLASSIFI
CONTAINER IDENTIFICATION NUMBER / GENERATOR ID NUMBER(B)	CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (RS)	8. WASTE AND CONTAINER WEIGHT (kg)	SURFACE RADIATION LEVEL mSv/hy	10. SURI CONTAL MBori dpm/1	AINATION 100 cm2 00 cm2	VASTE DESCRIPTOR (See Note 2 & Note 2A)	12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	SOLIDIFICATION OR STABILIZATION	CHEMICAL FORM CHELATING AGENT	WEIGHT	INDIVIDUAL CONTAINER	RADIONI IM IDĖS	AND ACTIVITY (ME	TVITY	CATION AS-Class Steble AU-Class Unstable B-Class C-Class
904/1	ļ. <u>.</u>		fton1	months.	AUPIN	GAMMA	 	ļ				RADIONUCLIDES	pCi/gm	MBq	mCI_	-tt
9047	4 .	0.21	65,77	 	NP	3.3400E-08	39-11	0.20	NA .	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	1.6798E-02 8.3990E-02	4.5400E-04 2.2700E-03	
	·	7.35	. 0.07	, <8.000E-03	NP	2.0000E+02		7,35		· .	l	Subtotal		1.1759E-01	3.1780E-03	'[
												Total	·	1.1759E-01	3.1780E-03	
						<u>. </u>		L			i					
00671	4	0.21	65.77	<8.0000£-05	NP	3.3400@-06	39-H	0.20	NA .	NONEMP	NP	C-14 H-3 Sr-80	1.00000E+0 1.00000E+0 5.00000E+0	1.6798E-02 1.6798E-02 8.3990E-02	4.5400E-04 4.6400E-04 2.2700E-03	AS
		7,35	0.07	<8.600E-03	NP	2.0000€+02		7.36				Subtotal		1.1759E-01		i
										·		Total ·		1.1759E-01	3.1780E-03	
•		·			ļ											1
* 008/1	4	0.21	65.77	<0.00008-05	NP	3,3400E-66	39-H	0.20	NA	NONE/NP	КP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	1.6798E-02 1.6798E-02 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
	,	7,35	0.07	<8.000E-03	NP	2.0000E+02		7.35				Subtotal]	1.1759E-01	3.1780E-03	i
												Total		1.1759E-01	3.1780E-03	Ī
007M	4	0.21	111,13	<8.0000E-05	NP	3.3400E-06	29,39-H	0.20	NA .	HONE/NP	ĦР	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7,35	0.12	<8,000E-03	NP	2.00005+02		7.35	<u> </u>			Subtotal		2.3510E-01	6.3540E-03	. 1
												Total		2.3510E-01	6.3540E-03	
				_		:							٠	' .		
008/1	4	0.21	111,13	<8,0000E-05	NP	3,14008-06	39,29-H	0.20	NA	NOMENP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		2.3510E-01	8.3540E-03	.f

FORM \$41A (10-96)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

				CONTAINE	4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	TE DEOCR	ETION CONTINU							3. PAGE 3 OF 24	PAGE(S)	
	DISPOSAL CON	TAINER DESC	RP TION	CUNTAINET	CANU WAS	IE DESUS	S I I CAN TOWN		WASTE DESCRIPTE							CLASSI
CONTAINER IDENTIFICATION NUMBER / GENERATOR	CONTAINER DESCRIPTION (Spe Note 1 &	7. VOLUME	8. WASTE : AND : CONTAINER WEIGHT	9, SURFACE RADIATION LEVEL	10. SURF CONTAM MBq/1 dpm/10	NATION Sma.00	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	CONTAINER	13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT	INDIVIOUAL RY CONTAINER TO	ADIONUCLIDE OTAL; OR CO	ES AND ACTIVITY (MB INTAINER TOTAL ACT CLIDE PERCENT		CATION AS-Clas Stable AU-Clas Unstal B-Clas
ID NUMBER(8)	Note 1A)	(m3) (R3)	(kg) (ton)	m\$v/r	ALPHA	BETA- GAMMA	1	(m3) (F13)	(0.001.0000)		1F>0.1%	RADIONUCLIDES	pCl/gm	MBq	mCi_	C-Clas
					-							Total		2.3510E-01	6.3540E-03	1
				l • !		•				·	"	·		1 1		<u> </u>
outu.	4	0,21	111,13	<8.0000E-05	NP	3,3400E-06	39,29-H	0.20	NA NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 6.00000E+	01 3.3559E-02 01 3.3559E-02 01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	NP	2.0000E+02	1	7.35				Subtotal		2:3510E-01	6.3540E-03	3
T												Total		2.3510E-01	6.3540E-03	
	·] .					l		j			İ				1
012/1	4	0.21	111,13	<8.0000E-05	NP	3.3400E-06	39,29-H	. 0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 3.3559E-02 01 3.3559E-02 01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	4 AS
		7.35	0.12	<8.000E-03	NP	2.00002+02		7.35				Subtotal		2.3510E-01	6.3540E-03	3
						-						Total		2.3510E-01	6.3540E-03	
		i		ŀ			<u> </u>	,	, ,							1
0141	4	0.21	111,13	<8.0000E-05	NP	3.3400€-66	38,29-H	0.20	NA	нонемь	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 3.3559E-02 01 3.3559E-02 01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	MP	2.00002+02		7.35				Subtotal		2.3510E-01	6.3540E-03	3
												Total		2.3510E-01	6.3540E-03	
		l						[·		i				.		1
OHEM .	4	0.21	111,13	<8.0000E-05	NP.	3,3400E-06	39,29-11	0.20	NA	HONEMP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 3.3559E-02 01 3.3559E-02 01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	41
	<u>.</u>	7,35	0.12	<8.000E-03	NP	2,0000E+02		7.35				Subtotal		2.3510E-01	6.3540E-03	3
												Total		2.3510E-01	6.3540E-03	
	1	1	l	1			I	i '	1	l	i			1 1		4

FORM 541A (10-98)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

3. PAGE 4 OF 24 PAGE(S)

			OTTO ST	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	ATION)						FAGE 4 OF 2		Tierra err
	DISPOSAL CON	TAINER DESCI	GPTION				 	PHYSICAL DESCR	WASTE DESCRIPTION	N FOR EACH WAST	ETYPEIN C	ONTAINER	15. RADIOLOGICAL	DESCRIPTION		15.WASTE
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR ID NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (FG)	8. WASTE AND CONTAINER WEIGHT (kg)	SURFACE RADIATION LEVEL	A(Bo/1	ENATION 00 cm2 00 cm2	WASTE DESCRIPTOR (See Note 2 8 Note 2A)	12. APPROXIMATE WASTE VOLUME(5) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION		WEIGHT	CONTAIN	AL RADIONUCLIDES ER TOTAL; OR CONT AND RADIONUCL	AND ACTIVITY (MI TAINER TOTAL AC IDE PERCENT		CATION AS-Class Stable AU-Class Unstab B-Class C-Class
016H	l		(ipn)	man_fac		GAMMA	39,29-H		NA NA	NONEMP		RADIONUCLIDES C-14	1.00000E+01	MBq 3.3559E-02	mCi 9.0700E-04	AS
		0.21	111.13	<8.0000E-05	NP	3.3400E-06		0.20			NP	H-3 Sr-90	1.00000E+01 5.00000E+01	3.3559E-02 1.6798E-01		
		7.35	, 0.12	. <8.000E-03	NP	2.0000E+02		7.35	<u> </u>			Subtotal		2.3510E-01	6.3540E-03	<u>''</u>
					<u> </u>							Total		2.3510E-01	6.3540E-03	
					<u> </u>						_					1
018/1	1	0.21	247.21	<2.5000E-04	NEP	3.3400'E-05	39,29,40-HL	0.20	NA.	NOHE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS 2
		7.35	0.27	<2.500E-02	· NP	2,0000E+02		7.35				Subtotal		5.8608E-01	1.5840E-02	4
												Total	·	5.8608E-01	1.5840E-02	
							<u> </u>								·	<u> </u>
020/1	- 4	0.21	111.13	<8.0000E-05	ΝP	3.3400E-08	39,29-H	0.20	NA.	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	! [
		7.35	0.12	<8.000E-03	. NP	2.00006+02		7.35				Subtotal		2.3510E-01	6.3540E-03	il .
· · · · · · · · · · · · · · · · · · ·												Total		2.3510E-01	6.3540E-03	
				,												}
022/1	4	0.21	111,13	<8.0000E-05	NP	3.3400E-06	39,29-11	0.20	NA	NONEANP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.0006-03	KP	2.0000E+02		7.35				Subtotal .		2.3510E-01	6.3540E-03	.1
												Total		2.3510E-01	6.3540E-03	-
															!	·
024/1	4	0.21	111,13	<8.0000E-05	МЬ	3.3480E-06	39, 29-H	0.20	NA	NONE/NP	MP The	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
														. 1		.2

FORM 541A (10-96)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

				CONTAINE		TE DESCRI	PTION (CONTINU	ATIONS			•		3. PAGE 5 OF 2	4 PAGE(S)	
	DISPOSAL CON	TAINER DESC	RIPTION						WASTE DESCRIPTION						CLASSIF
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3) (E3)	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	10. SURF CONTAN MBo/1 dprs/10	NATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (FT3)	13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT	INDIVIDUAL RADIO CONTAINER TOTAL	ICLOGICAL DESCRIPTION NUCLIDES AND ACTIVITY (M ; OR CONTAINER TOTAL AC ADIONUCUDE PERCENT	Bq) AND	CATION AS-Class Stable AU-Class Unstab B-Class C-Class
IO NUMBER(S)	Note 1A)	(#3)	(kg) (ton)	msvhr menvhr	ALPHA	BETA- GAMMA		(F13)	(=====		IF>0,1%	PADIONUCLIDES :	CUgm MBq	mCi.	C-Closs
,	·											Total	2.3510E-01		
•			1	1						ţ			-		
026/1	4	0.21	111.13	<8.0000E-05	MP	3.3400E-06	39,29-H	0.20	NA ,	HONE/NP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 3.3559E-02 000E+01 3.3559E-02 000E+01 1.6798E-01	9.0700E-04 9.0700E-04 4,5400E-03	AS
		7,35	0.12	<0.000E-03	MP	2.0000E+02		7.35	'	,		Subtotal	2.3510E-01		4
											,	Total	2.3510E-01	6.3540E-03	
				-			<u>'</u>		,		İ		.	·	
630/1	4	0.21	111.13	<8.0000E-05	ИDP	3.34006-06	39,29-11	0.20	NA	NONEMP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 3.3559E-02 000E+01 3.3559E-02 000E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7,35	0.12	<8.000E-03	NP	2.0000E+02		7.35				Subtotal	2.3510E-01		-1
	•											Total	2.3510E-01	6.3540E-03	
]								
031/1	4 .	0.21	1,11.13	<8,0000E-05	NР	3.3400E-06	39,29-H	0.20	NA NA	NONE/NP	NEP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 3.3559E-02 000E+01 3.3559E-02 000E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7,35	0.12	<8.080E-03	· NP	2.0000E+02		7.35	i			Subtotal	2.3510E-01		.1
												Total	2.3510E-01	6.3540E-03	-
	•														İ
032/1	4	0.21	111,13	<8.0000E-05	NP	3,34008-06	39,29-H	0.20	NA	NONE/NP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 3.3559E-02 000E+01 3.3559E-02 000E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	. 0.12	<8,0006-03	NP	2,0000E+02		7.38				Subtotal	2.3510E-01	6.3540E-03	.1
	·											Total	2.3510E-01	6.3540E-03	
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FORM 541A (10-98)

FORM 641A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

3. PAGE 6 OF 24 PAGE(S)

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6227	IDENTIFICATION NUMBER / GENERATOR	CONTAINER DESCRIPTION (See Note 1 &	VOLUME	AND CONTAINER WEIGHT	SURFACE RADIATION LEVEL	CONTAI MBo/1 dpm/1	MENATION 180 cm2 00 cm2 BETA-	WASTE DESCRIPTOR (See Note 2	12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER	13. SOLIDIFICATION OR STABILIZATION MEDIA	CHEMICAL FORW	WEIGHT % CHELATING AGENT	INDR/IDUAL CONTAINER	RADIONUCLIDES TOTAL; OR CONT AND RADIONUCL	AND ACTIVITY (ME PAINER TOTAL ACT 106 PERCENT	TVITY	CATION AS-Class Stable AU-Class Unstable B-Class C
1						- AUTTA	GAMMA		 	<u> </u>					MBq	mCl	
10347 4 0.21 111.13 42.000E45 NP 1.340RE42 33.2541 0.20 MA NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOMERNP NOM			0.21	111.13	<8.0000E-05	КP	3.3400E-08	39,29-11	0.20	NA .	NONE/NP	NP	H-3	1.00000E+01 1.00000E+01 5.00000E+01			
Total 2.3510E-01 8.3540E-03		•	7.35	0.12	<8.000E-03	. N₽	2.0000E+02	•	7.35]		,	Subtotal	(·	2:3510E-01	6.3540E-03	1
0.21 111.13 0.0000E-05 NP 1.3400E-05 NP 2.0000E-02 7.36 NP 2.0000E-01 1.5780E-01 0.4540E-03													Total				
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05771 4 0.21 111.15 48.0000E-05 NP 3.340E-05 NP 2.6000E-02 NP 2.6000E-02 NP 2.6000E-02 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E-03 NP 3.340E	034/1	•	0.21	111.13	<8,0000E-05	NP	3.3400E-06	38,29-H	0,20	NA	NONEMP	NP	H-3	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	
CST/T 4			7,35	0.12	<8.000E-03	NP	2.00002+02		7.36						1		
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7.35 0.12 <0.000E+02				·					,								
04371 4 0.21 292.57 <0.0000E-05 NP 3.3400E-08 0.20 NA NONEMP C-14 1.0000E+01 1.0064E-01 2.7200E-03 AS 1.0000E+01 1.0064E-01 1.3600E-02 7.35 0.32 <0.000E-03 NP 2.000E-02 7.35	037H	1	. 0.21	111.13	<8.0606E-05	NP	3.3400E-06	39,29-H	0.20	NA NA	NOKE/NP	NP	H-3	1 1.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS .
0437		-	7.35	0,12	<8,000€-03	NP	2.0000E+02		7,35								
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7.35 0.32 <8.000E-03 NP 2.000E-02 7.35 Subtotal 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E-02 7.0448E-01 1.9040E	043/1		0.21	292.57	<8.0000E-05	NP	3,3400E-08	29,39-H	0.20	NA .	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS.
0441 4 0.31 247.21 <0.0000E-05 NP 3.3400E-08 0.20 NA NONENP C-14 1.00000E+01 8.3990E-02 2.2700E-03 AS NP 57-90 - 5.00000E+01 4.1810E-01 1.1300E-02			7,35	0,32	<8.000E-03	MP	2.6000E+02	`	7,35				Subtotal		7.0448E-01	1.9040E-02	ł
										Ì							
	044/1	4	0.21	247.21	<8.0000E-05	₩₽	3.3400E-98	29,59-H	0.20	NA .	NONEMP	1	H-3	1.00000E+01 1.00000E+01 5.00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS .
			7.35	0.27	<8.000g-03	NP	2,000000402		7.35				Subtotal				1

FORM 541A (10-96)

RM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

3. PAGE 7 OF 24 PAGE(S)

			· · · · · · · · · · · · · · · · · · ·	CONTAINER	R AND WAS	TE DEŠCRI	PTION (CONTINU	ATION)					3.	PAGE 7 OF 2		
	DISPOSAL COM	TAINER DESC	RELICH.					PHYSICAL DESCRI	WASTE DESCRIPTION	N FOR EACH WAST	E TYPE IN C	ONYAINER	S. RADIOLOGICAL	NESCRIPTION .		16.WASTE CLASSIFI-
CONTAINER DENTIFICATION NUMBER / GENERATOR	6. CONTABLER DESCRIPTION (See Nats 1 &	7. VOLUME (m3) (R3)	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	dom/10		11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE	13. SOLIDIFICATION OR STABILIZATION	·	WEIGHT	INDIVIDUAL CONTAINE	RADIONUCLIDES A R TOTAL; OR CONT. AND RADIONUCLI	IND ACTIVITY (ME	kg) AND NVTY	CATION AS-Cless A Stable AU-Class A Unstable B-Class B C-Class C
ID NUMBER(S)	Note (A)	(163)	(leg) (loci)	enSviter mentile	ALPHA	GAMMA		(F13)			#-0.1%	RADIONUCLIDES	pCl/gm	MBq	mCl:	
												Total		5.8608E-01	1.5840E-02	
	<u> </u>			 -	<u> </u>				ļ		ļ	0.44	1.00000E+01	9 2000E 02	2.2700E-03	AS
045/1	4	0.21	247.21	<8.0000E-05	MP	3.3400E-08	29,39-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 6.00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 1.1300E-02	
		7.35	0.27	≪8.000E-03	KP	2.00000E+02		7,35				Subtotal		5.8608E-01	1.5840E-02	
]			Total		5.8608E-01	1.5840E-02	Ė
									<u> </u>							
052/1	4	0,21	166.49	<8.0000E-05	ч	3.34005-08	39,29,L.+H.	0,20	NA	NONEMP	МP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 6.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	КP	200006+02		7,38				Subtotal		3.5224E-01	·	
												Total		3.5224E-01	9.5200E-03	
									1	İ	<u> </u>					
053/1	1	0,21	156,49	<8.00000€-05	NP	3,3400E-06	39,29,1HL	8,20	NA NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	чи	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
] .			Total		3.5224E-01	9.5200E-03	
054/1	4	0.21	65.77	<8.000005-05	NP	3.3400E-06	39 [†] T-HIL	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.6798E-02 1.6798E-02 8.3990E-02	4.5400E-04 4.6400E-04 2.2700E-03	AS
_		7.35	0.07	<0.000E-03	NP	2.00005+02		7,35				Subtotal		1.1759E-01	3.1780E-03	•
_												Total		1.1759E-01	3.1780E-03	
FORM 541A (10-98)	·	***************************************														

FORM 541A (10-98)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

3. PAGE 8 OF 24 PAGE(S)

1				· •	CONTAINE	PAMN WAS	TE DESCR	PTION (CONTINU	ATION)		•		•	3, PAGE 8 OF	24 PAGE(S)	
	· · · · · · · · · · · · · · · · · · ·	DISPOSAL COM	TAINER DESC	RIPTION	MANAGEMENT	CANTO DE		- III		WASTE DESCRIPTION	IN FOR EACH WAST	ETYPEINC	ONTAINER			6.WASTE
٠	CONTAINER DENTIFICATION NUMBER / GENERATOR	CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME _(m3) _(R3)	E. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	_MBat1 dpm/1	INATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCR 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3)	13. SOLIDIFICATION OR STABILIZATION	14, CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT % CHELATING AGENT	INDIVIDUAL RADION CONTAINER TOTAL	IOLOGICAL DESCRIPTION NUCLIDES AND ACTIVITY OF CONTAINER TOTAL A ADIONUCLIDE PERCENT	MBQ) AND CTIVITY	CATION AS-Class Stable AU-Class Unstable B-Class (C-Class (
<u> </u>	D NUMBER(S)	Note 1A)	(H3)	(kg) (ton)	mSv/hr mrem/hr	ALPHA	GAMMA		(F13)			IF>0.1%		Cilgm MBq	anCi .	
055/	i .	4	0.21	168.49	<8.0000E-05	NP	3.3400E-06	39,29,L-HL	0.20	NA	NONEMP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 5.0320E-0 000E+01 5.0320E-0 000E+01 2.5160E-0	2 1.3600E-03 2 1.3600E-03 1 6.8000E-03	AS
			7.36	0,17	, <8.000€-03	NP	2.0000E+02	`	7,35				Subtotal	3.5224E-0		
										 			Total	3.5224E-0		
										<u> </u>				0005 of 3 35505 o	2 9.0700E-04	AS
056/	n	•	0,21	111.13	<0.0000E-05	NP.	3.3400E-08	39,29-H	0.20	NA .	NONEMP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 3.3559E-0 000E+01 3.3559E-0 000E+01 1.6798E-0		A3
L			7,35	0,12	<8.000E-03	NP	2.0000E+02		7.35				Subtotal	2.3510E-0	1 6.3540E-03	
										•			Total	2.3510E-0		
<u> </u>		·											·			
058/	1	4	0.21	159,49	<8.0000E-06	NP	3.3400E-06	39,29,1,411.	0.20	NA .	NONEMP	NP	C-14	000E+01 5.0320E-0 000E+01 5.0320E-0 000E+01 2.5160E-0	2 1.3600E-03 2 1.3600E-03 1 6.8000E-03	AS
			7.35	0.17	<8.000E-03	NP	2.00005+02		7.25				Subtotal	3.5224E-0		
													Total	3.5224E-0		í:.
				<u> </u>		<u> </u>										
0597	1	4	0.21	111.13	<8.0000E-05	NP	3,3400E-06	39,29,£4f£	0.20	NA	NONE/NP	NP	H-3 1.00	000E+01 3.3559E-0 000E+01 3.3559E-0 000E+01 1.6798E-0	2 9.0700E-04	AS
			7,35	0.13	<8.000E-03	N₽	2.0000E+02		7.35		,		Subtotal	2.3510E-0		
													Total	2.3510E-0	6.3540E-03	
						•										
061/	1	4	0.21	111,13	<8.5000E-05	, NP	3.3400E-06	39,29-H	0.20	NA	NONEMP	N#P	C-14 1.000 H-3 1.000 Sr-90 5.000	000E+01 3.3559E-0 000E+01 3.3559E-0 000E+01 1.6798E-0	9.0700E-04 9.0700E-04 4.5400E-03	AS
	, E41A (10 00)		7.35	0.12	<8.000€-03	NP	2,0000E+02		7.35				Subtotal ·	2.3510E-0	6.3540E-03	

FORM 541A (10-96)

FORM 541A

FORM 640 UNIFORM LOW-LE WASTE	5. SHIPPER - NAME AND FACILITY U.B. Army Corps Of Engineers CEIARE EN 16 10 Bouth Howard Street Bailimore, BID 21201-1715 USER PERMIT NUMBER NA 4032-01-002				MENT LD. NUMBER 4032-01-002 COLLECTOR PROCESSOR	7. FORM 540 AND 540A PAGE 1 OF 7 PAGE(5) FORM 541 AND 541A 24 PAGE(5) FORM 542 AND 542A Hone PAGE(5) ADDITIONAL INFORMATION HONE PAGE(5) 9. CONSIGNEE - Name and Facility Address				MANIFEST NUMBER (Use this number on all continuation pages) 4032-01-002 CONTACT Stipping and Receiving			
, SHIPF					GENERATOR TYPE (Specify) G								
1. EMERGENCY TELEPHONE NUMBER (Include Area Code) 800-426-9878 ORGANIZATION				Honorish .	(Inch:	PHONE NUMBER de Area Code) 0-682-9184	Envirocate of Ulab, Inc. City Disposal Site Interstate 60, Edit 49 City, UT 64029				TELEPHONE NUMBER (include Area Code)		
PrankEn Environmental Services 2. IS THIS AN "EXCLUSIVE USE" SHIPMENT?	T	8. CARRIER - Name and Address Franklin Environmental Service				EPA LD. NUMBER MAD084814138		TURE - Authorite	ed consignee scknowls	DATE			
T VES	PACKAGES IDENTIFIE		185 Industria				PING DATE				CERTIFICATION	<u> </u>	
X NO A DOES EPA REGULATED WASTE REQUIRING A YES EPA MANIFEST NUMBER			Robert Tess SIGNATURE - Authorized parties acions hedging waste receipt				PHONE NUMBER Ide Area Code) 0-428-8878	This is to certify that the herein-named materials are properly classified, described, packaged, marked, and tabel in proper condition for transportation according to the applicable regulations of the Department of Transportation, certifies that five materials are classified, packaged, marked, and tabels and are in proper condition for transport (playposet as described in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regular					
MANIFEST ACCOMPANY X NO THIS SHEMENT? If "Yes," provide Manifest Number	NA						DATE 01-24-01		AUTHORIZED SKANATURE TITLE			me Novembranega	
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper http://grame, hazard class, UN ID number, and any additional information		12. DOT LABEL "RADIOACTIVE"	12. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		15. RIDIVIDUAL RADIONUCLIDES		TOTAL PACKAGE ACTIVITY MBq MCI		17. LEASCO GLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate wate)	19. IDENTIFICATION NUMBER OF PACKAGE	
Radioactive material, excepted packa material, 7, UN2910	ge-limited quantity of	NA	NA	Solid /NA		H-3	Sr-90		.3510E-01	6.3540E-03	NA	245. LBS; 7,35 FT3	001
Radioactive material, excepted packs material, 7, UN2910	ge-limited quantity of	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.	.1769E-01	3.1780E-03	NA ·	145. LBS; 7.35 FT3	002
Radioactive material, excepted packar material, 7, UN2910	ge-limited quantity of	NA .	NA	Solid /NA	C-14 I	1-3	Sr-90	Ĭ.	.1769E-01	3.1780E-03	NA .	145. LBS; 7.35 FT3	003
Radioactive material, excepted packar material, 7, UN2910	ge-limited quantity of	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.	.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	004
Radioactive material, excepted package material, 7, UN2910	ge-limited quantity of	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.	.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	005
Radioactive material, excepted packar material, 7, UN2910	ge-limited quantity of	NA:	NA.	Solid /NA		1-3	Sr-90	1.	.1759E-01 .	3.1780E-03	NA	145. LBS; 7.35 FT3	006
Radioactive material, excepted packa material, 7, UN2910	ge-limited quantity of	NA	NA	Solid /NA	C-14	13	Sr-90	Ž	3510E-01	8.3540E-03	NA	245, LBS; 7.35 FT3	007
Radioactive material, excepted packa material, 7, UN2910	ge-limited quantity of	NA .	NA	Solid /NA	C-14	H-3	Sr-90	2	3510E-01	8.3540E-03	NA	245. LBS; 7.35 FT3	008
FOR CONSIGNEE USE ONLY		Record Waste Description or Le	•	A etsup	AS AND CONDITION HAZARDOUS MATERI hiszardous waste, file s confilention as required	ilipment i	is also accompanied by	mante that a separate	Weste Material _ and completed h	ezardous wasta manife	ol e hazardous waste a st, along with the appro	delined in 40 CFR 281, criste land-disposal restri	Where the material is a

TITLE Upon acceptance at the disposal site by Environace of Utah, Inc., and all appropriate regulatory authorities, title to the Waste Material which conforms to Generator's representations hardin shall thereupon transfer from Generator and be vested in Environate of Utah, Inc.

WASTE MATERIAL: Generator represents and warrants that all data set torth in this (UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST) are true and correct in all respects and in accordance with all applicable governmental laws, rules, regulations and Environment Utafu, Inc.'s facility licerse.

HIDEMRIFICATION. Generator agrees to Indemnity Envirocare of Utah, Inc., its officers, employees and agents against all losses and flability whatsoever it such losses or liability results from the failure of the Waste Moterial to conform in all natural respects to the data supplied on the (UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST.) or if this stripment fails to meet the standards prescribed by the Department of Transportation or any governmental agency having jurisdiction over such matters.

Contamination or Leakage Detected

Container Integrity Inadequate

Unexpected Exposure Rates Detected Labels, Markings, etc. inadequate

No Violations Detected on this Shipment.

FORM 540 (10-96)

WASTE SHIPMENT RECORD

٠	•						
	1. Work site (Generator):	<i>:</i>	Owr	er's Name		Owne	
	Name US Army Corps of Engineers-Baltimo	ore Dist.	St. All	an's VAE	c te	lephon	ie no .
**	Mailing Address CENAE-EN-HI. 10 South Howar	d Street					
الزرار	City/State/Zip Baltimore, MD 21201-1715						
	2. Remover's name and address:					Remov	
	Franklin Environmental Services, Inc.				1	lephon	
	185 Industrial Read, PO Box 617				(508	3) 384~	6151
	Wrentham, MA 02093		0.5.2.2	 			
	3. Waste Disposal Site (WDS)	. 3 . 0 . 4	WDS	one no: (4	35) 884-0	155	
	Name Envirocare of Utah, Clive Dispos Mailing Address Interstate 80, Exit 49	al Site					
	City/State/Zip Clive, UT 84029		Additi	onal Inform	iation:	•	-
			7	Profile I	u= [a]a	T	
£C.	Physical Interstate 80, Exit 49 Site Location Clive, UT 84029	. •		Profile	VO. 14 10	3 2	السلسل
GENERATOR							
Ä	4. Name and address of responsible agency						ļ
遊							
E				-			
୍ଷ			1 0 0			Fanal	
	5. Description of materials		No.	ontainers Typ		Total qu m³ (ye	Jantity J ³)
	RQ, ASBESTOS, 9, NA2212, III		1 .		. I		
	RQ = 1 LB (ONE POUND)		18	يو- 55 محدد		2.	40-
					3		,
	8. Special handling instructions and additional info	ormation (pr	ovided b	y generato	r.)	٠.	
	Linited Quantity Radionalise M						
	9. OPERATOR'S CERTIFICATION: I hereby declar						
1	¹ accurately described above by proper shipping n						
	are in all respects in proper condition for transp				olicable inte	rnatio	nal and
	government regulations. NOTE: Generator must	retain a coj	by of this	TOPM.			
	Printed/typed name & title	01:	Signature	· _	Month	Day	Year
	Aubert Tens - Proved Manager	20 gr		10-	0)	<u>23 </u>	0)
	10. Transporter 1 (Acknowledgment of receipt of ma	aterials)	0		•		_
	Printed/typed name & title		Signature		Month	Day	Year
	Paul M Colonna						
	_ *	· /)	1 /	luna	į		
200	Franklin Environmental Services Inc.	Thull	In ter	Cerus	01	24	01
2	Address and telephone no. 185 Industrial Yead 80046 4878	, , , , ,					
R	Wrentham, MA 02093	·			-		
) d S	· · · · · · · · · · · · · · · · · · ·	l		<u></u>	<u> </u>		
TRANSPORTER	11. Transporter 2 (Acknowledgment of receipt of ma	iterials)					
RA	Printed/typed name & title		ignature		Month	Day	Year
-							i
	·						j
	Address and telephone no.						i
ш	12. Discrepancy indication space	<u> </u>		Rejected:			
SITE				Yes	☐ No	П	l
. 4	13. Waste disposal site owner or operator: Certification	n of receipt	of ashest				
,	materials covered by this manifest except as noted	in Item 12.	U1 430631				į
DISPO	•						
018	Printed/typed name & title	5	Signature		Month	Day	Year
		L					

ORIGINAL RETURN TO GENERATOR

Envirocare of Utah, Inc.

1.00000E+01 1.00000E+01 5.00000E+01

3.3559E-02 3.3559E-02 1.6798E-01

2.3510E-01

2.3510E-01 - 6.3540E-03

9.0700E-04 9.0700E-04 4.5400E-03

6.3540E-03

2. MANIFEST NUMBER 4032-01-002

3. PAGE 9 OF 24 PAGE(S)

CONTAINER AND WASTE DESCRIPTION (CONTINUATION) DISPOSA CONTAINER DESCRIPTION WASYE DESCRIPTION FOR EACH WASYE TYPE IN C CLASSIFI-CATION AS-Class A Stable AU-Class A PHYSICAL DESCRIPTION 15. RADIOLOGICAL DESCRIPTION a. - WASTE SURFACE CONTAINER SURFACE RADIATION WASTE DESCRIPTOR (See Note 2 WASTE VOLLIME(S) IN CONTAINER (m3) (FT3) SOLDIFICATION WEIGHT OR STABILIZATION CHEMICAL FORM/ % MEDIA CHELATING AGENT CHELATING AND CONTAINER WEIGHT INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MÉG) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT CONTAMINATION CONTAINER IDENTIFICATION NUMBER! GENERATOR ID NUMBER(S) CONTAINER VOLUME M8a/100 an2 dpn/100 an2 Unstable 8-Class 8 C-Class C (See Note 1 & Note 1A) & Note 2A) ALPHA, RADIONUCLIDES 6.3540E-03 Total 2.3510E-01 062/1 39,29-H NA NONEMP 0.21 111.13 <8.0000E-05 3.3400E-06 0.20 H-3 Sr-90 3.3559E-02 1.6798E-01 9.0700E-04 4.5400E-03 7.35 <8,000E-03 2.00006+02 Subtotal 2.3510E-01 6.3540E-03 7.35 Total 2.3510E-01 6.3540E-03 063/1 39,29-H NONEMP 1.00000E+01 Q.21 111.13 <8.0000E-05 3.3400E-06 0.20 H-3 Sr-90 1.00000E+01 9.0700E-04 4.5400E-03 7.35 0.12 <0.000E-03 7,35 Subtotal 2.3510E-01 8.3540E-03 Total 2.3510E-01 6.3540E-03 084/1 39,29-11 C-14 H-3 Sr-90 9.0700E-04 9.0700E-04 4.5400E-03 NONE/NP 0.21 <8.0000E-06 3.34002-06 0.20 7.35 <8.000€-03 2.0000E+02 Subtotal 7.35 2.3510E-01 6.3540E-03 Total . 2.3510E-01 6.3540E-03

0.20

7.35

NONEMP

C-14

H-3 Sr-90

Total

Subtotal

39,29-H

3.3400E-08

2.0000€+02

UNIFORM LOW-LEVEL RADIOACTIVE

WASTE MANIFEST

FORM 541A (10-98)

0.21

7.35

111.13 <8.0000E-05

<8.000E-03

0.12

065/1

FORM 541A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

				,	AAWO		resi.						1		4 0405(0)	
	DISPOSAL CON	TAINER DESC	OPTION ·	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	IATION)	Water Beerging	 		and the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of th	<u>. L</u>	3. PAGE 10 OF 2		Toronto.
	DEFOGRECOIN	TANEK OCUO	W HOLE		Γ			PHYSICAL DESCRI	WASTE DESCRIPTION	IN FOR EACH WAS	CE TYPE IN C		PADIOI OG	ICAL DESCRIPTION		16.WASTI CLASSIF
CONTAINER IDENTIFICATION MUMBER! GENERATOR ID NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) (R3)	8. WASTE AND CONTAINER WEIGHT (kg)	SURFACE RADIATION LEVEL	10. SURF CONTAM MB0ft dpm/fi	INATION 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE	13. SOLIDIFICATION OR STABILIZATION		WEIGHT	INDIVIDUAL RAC CONTAINER TO	DIONUCLE TAL: OR C	DES AND ACTIVITY (ME) CONTAINER TOTAL ACT FUCLIDE PERCENT	1) AND IVITY	CATION AS-Class Stable AU-Class Unstab B-Class C-Class
065/1	4		(kg) (ton)	corece/fre	ALPHA .	GAMMA					1770,178	RADIONUCLIDES	pC//gm		mCl .	J
4		,0.21		<8.0000g-05	NP NP	3.3400E-08	39,29-H	0.20	NA NA	HONEMP	NP	IH-3 1.	300000E 300000E	+01 3.3559E-02	9.0700E-04 9.0700E-04 4.5400E-03	A5
		7.35	0.12	<8.000E-03	NP NP	2.000000000	ļ	. 7,35			1	Subtotal		2.3510E-01	6.3540E-03	4
												Total		2.3510E-01	6.3540E-03	
		,		}					i		1			1		
968/1	4	0,21	111.13	<8.0000E-05	NP	3,3400E-06	39,29-11	6.20	NA	NONE/NP	NP	C-14 1. H-3 1. Sr-90 5.	300000. 300000. 300000.	+01 3.3559E-02 +01 3.3659E-02 +01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	H
		7.38	0.12	<8.000E-03	MP	2,0000E+02		7.35				Subtotal		2.3510E-01	6.3540E-03	.l
												Total		2.3510E-01	6.3540E-03	
															• .	
06W1	4	0.21	111.13	<8.0000E-06	· MP	3,3400E-06	39,29-H	0.20	NA	NONE/NP	КР	C-14 H-3 Sr-90	.00000E	+01 3.3559E-02 +01 3.3559E-02 +01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	ŧ I
		7,35	. 0,12	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		2.3510E-01	6.3540E-03	i
			_									Total		2.3510E-01	6.3540E-03	
]							100
071/1	4	0.21	111.13	<8.0000E-05	ИР	3.34000-08	39,29-H	0.20	NA	NONE/NP	NDP	C-14 1. H-3 1. Sr-90 5.	300000E	+01 3.3559E-02 +01 3.3559E-02 +01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7,35	0.12	<8.000E-03	ИP	2.0090E+02		7.35			1.	Subtotal		2.3510E-01	6.3540E-03	· I
												Total	•	2.3510E-01	6.3540E-03	
	·						,			,						(
9741	4	0.21	292.57	<8.0000E-05	NP	3.3400E-06	29,39-H	0,20	NA :	NONE/NP	l i	C-14 1. H-3 1. Sr-90 5,	00000E	+01 1.0064E-01 +01 1.0064E-01 +01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	
	,	7.35	0.32	<8.000E-03	NP	2.0000E+02	! `	7.35			1 1	Subtotal			1.9040E-02	.1

FORM 541A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

· · · · · · · · · · · · · · · · · · ·	·	· ·	· · ·	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	(ATION)				<u> </u>	i	3. PAGE 11 OF 2	4 PAGE(S)	
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR ID NUMBER(5)	G. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	8 (m3)	8, WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	MBa/1 dpm/1	FACE INATION 100 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12 APPROXIMATE WASTE		14. CHEMICAL DE	WEIGHT	15. INDIVIDUAL R CONTAINER	RADIONUCLE TOTAL: OR C	ICAL DESCRIPTION DES AND ACTIVITY (MB CONTAINER TOTAL ACT UCLIDE PERCENT	AND IVITY	CLASSII CLASSII CATIOI AS-Class Stable AU-Class Unstal B-Class C-Class
io Noncerdo)		(10)	(ton)	men/m	ALPHA	GAMMA	 		<u> </u>		u-xu ix	RADIONUCLIDES	pCVqm		mCi_	
,						 			,			Total .		7.0448E-01	1.9040E-02	1
076/1	4	0.21	292.57	<8.0000E-05	NP	3.34005-06	29,39-H	0,20	NA.	NONE/NP		C-14 H-3	1.00000E 1.00000E 5.00000E	+01 1.0064E-01 +01 1.0064E-01 +01 5.0320E-01	2.7200E-03 2.7200E-03 1.3500E-02	AS
		7,35	0.32	<8.000E-03	NP	2.00006+02		7.35			NP	Sr-90 Subtotal	3.00000E	7.0448E-01	1.9040E-02	-1 .
						ļ	;			·		Total		7.0448E-01	1.9040E-02	
078V1	4			ļ			29,39-41		NA NA	NONEMP		C-14	1.00000E	401 1 0064E-01	2.7200E-03	3 AS
	,	7.35	292,57	<8.000E-05	NP NP	3,3400E-08	iş iş	0.20			1 .	H-3 Sr-90	1.00000E	+01 1.0064E-01 +01 5.0320E-01	2.7200E-03 1.3600E-02	2
		/20	0,32	C0.000E-03	No	200002	,	7.35				Subtotal Total		7.0448E-01	1.9040E-02	.
			· ·	·					~					7,07702-01	100102-02	
088H	4	0.21	111.13	<8.0000E-05	NP	1,1400E-06	39,29-11	. 0.20	NA .	NONEMP	МP	C-14 H-3 Sr-90	1.00000E 1.00000E 5.00000E	+01 3.3559E-02 +01 3.3559E-02 +01 1.5798E-01	9.0700E-04 9.0700E-04 4.5400E-03	\$ 1 .
		7.35	0.12	<8.000E-03	· NP	2.0000E+02		7.35				Subtotal	J.00000E	J · ·	6.3540E-03	.1
												Total		2.3510E-01	6.3540E-03	
093/1	4					 	29,39-H		NA NA	NONE/NP		C-14	1.00000	1.0064E-01	2.7200E-03	AS I
	<u> </u>	0.21	292.57	<8.000E-03	NP NP	3.3400E-06 2.0000E+02		0.20		,,	NP	: !	1.00000E4 1.00000E4 5.00000E4		2.7200E-03 2.7200E-03 1.3600E-02	·I
		7.35	9.32	44.00VE-03	nP	Z00005+03		7.35		ļ		Subtotal		7.0448E-01	1.9040E-02	
		••												7.04405-01	1.30405-02	Ι.

FORM 541A (10-96)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

113/1 4 0.21 158.49 <8.000E-05 NP 3.340E-06 7.35 NA NONENP C-14 H-3 Sr-90 Subbol 113/1 4 0.21 156.49 <8.000E-03 NP 2.000E-02 7.35 NA NONENP Total 7.35 0.17 <8.000E-03 NP 2.340E-06 7.35 NA NONENP C-14 H-3 Sr-90 Subbol 7.35 0.17 <8.000E-03 NP 2.000E-02 7.35 NA NONENP Total 7.35 0.17 <8.000E-03 NP 2.000E-02 7.35 NA NONENP Total 7.35 0.17 <8.000E-03 NP 2.000E-02 7.35 NA NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-14 NA NONENP C-	15. RADIOLOGICAL DESCRIPTION INDIVIDUAL RADIONUCLIDES AND ACTIVITY (N CONTAINER TOTAL; OR CONTAINER TOTAL AND AND RADIONUCLIDE PERCENT RACIONUCLIDES PCFgm M84	AU-Class Unstab B-Class C-Class
1. 1. 1. 1. 1. 1. 1. 1.	INDIVIDUAL RADIOMUCLIDES AND ACTIVITY (N CONTAINER TOTAL, OR CONTAINER TOTAL AN AND RADIOMUCLIDE PERCENT RADIOMUCLIDES PCFgm MEG	MBq) AND CATION AS-Class Stable AU-Class C-Class
1121 4 0.21 156.49 <8.000E-05 NP 3.3400E-05 7.35 NA NONERP C-14 H-3 Subbot 1321 4 0.21 156.49 <8.000E-03 NP 2.000E-02 7.35 NA NONERP Total 1321 4 0.21 156.49 <8.000E-03 NP 3.3400E-08 39,29-H 0.20 NA NONERP C-14 H-3 Subbot 1321 156.49 <8.000E-03 NP 2.000E-02 7.35 NA NONERP Total 1321 4 0.21 156.49 <8.000E-03 NP 2.000E-02 7.35 NA NONERP Total 1321 NA NONERP Total 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 H-3 Subbot 1321 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NONERP C-14 NA NA NA NONERP C-14 NA NA NA NONERP C-14 NA NA NONERP C-14 NA NA NA NA NA NA NA NA NA NA NA NA NA		mCl
Total 1121 4 0.21 158.49 <8.0000E-03 NP 3.3400E-06 7.35 7.38 0.17 <8.000E-03 NP 2.000E+02 7.35 1131 4 0.21 158.49 <3.000E-03 NP 3.3400E-06 7.35 NONEMP Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total Total		
158.49	! !	1 1
113/1 4 0.21 156.49 <0.000E-03 NP 2.000E+02 7.35 Pr.S0 Subtol 113/1 4 0.21 156.49 <0.000E-03 NP 3.340E-08 0.20 NA NONERP C-14 1-3 7.35 0.17 <0.000E-03 NP 2.000E+02 7.35 Pr.S0 NA NONERP Total 113/1 4 0.21 156.49 <0.000E-03 NP 2.000E+02 7.35 Pr.S0 Subtol 113/1 4 0.21 156.49 <0.000E-03 NP 2.000E+02 7.35 Pr.S0 Subtol 113/1 4 0.21 156.49 <0.000E-03 NP 2.000E+02 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr.S0 Pr		
113/1 4 0.21 156.49 <0.0000E-03 NP 3.3400E-08 0.20 NA NONERP C-14 H-3 NP Sr-90 Subtol Total	-3 1.00000E+01 5.0320E-02	12 1.3600E-03 AS 12 1.3600E-03 11 6.8000E-03
113/1 4 0.21 156.49 < 3.0000E-03 NP 3.3400E-02 7.35	ubtotal 3.5224E-0	11 9,5200E-03
9.21 156.49 <8,0000E-03 NP 3,3400E-06 0.20 H-3 Sr-90 Subbot T.23 0.17 <8,000E-03 NP 2,000E-02 T.24 Total Total	otal 3.5224E-0	9.5200E-03
9.21 155.49 <3.0000E-03 NP 3.3400E-08 0.20 H-3 Sr-90 Subbot T.23		
7.35 0.17 <8.007E-03 NP 2.000E+02 7.35 Subtot Total 11971 4 3 39.29-H NA NOMERUP C-14	.3 1.00000E+01 5.0320E-03	12 1.3600E-03 AS 12 1.3600E-03 11 6.8000E-03
1191 4 39,29-H NA NOMERSP C-14	ubtotal 3.5224E-0	
		9.5200E-03
	• 1	
0.21 155.49 <0.0000E-05 NP 3.3400E-06 0.20 H-3 NP Sr-90	3 1.00000E+01 5.0320E-02	2 1,3600E-03 1 6.8000E-03
7.35 0.17 <\$,000E-03 NP 2.0000E+02 7.35 Subtot	1btotal 3.5224E-01	9.5200E-03
Total	otal 3.5224E-01	
		<u> </u>
123/1 4 0.21 158.49 <8.0000E-06 NP 3.3400E-06 39,29-H 0.20 NA NONENP C-14 H-3 NP S-90	14	2 1.3600E-03 AS 2 1.3600E-03 1 6.8000E-03
7.35 0.17 <8.000E-03 NP 2.000E+02 Z.35 Subtot	ubtotal 3.5224E-01	9.5200E-03
Total	3.5224E-01	1 9.5200E-03
FORM \$41A (10-86)	i i	

FORM 541A (10-96)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

	· · · · · · · · · · · · · · · · · · ·			CONTAINE		TE DESCR	ETION (CONTINE	IATIONS				•	3. PAGE 14 OF	24 PAGE(S)	
	DISPOSAL CO	NTAINER DESC	REPTION	MANUAL PRINCE		- VEGUIS			WASTE DESCRIPTION	IN FOR EACH WAST	E TYPE IN C	ONTAINER			IE.WAST
S. CONTAINER FOENTHICATION NUMBER 1 GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8, Waste And Container Weight	9. SURFACE RADIATION LEVEL	MBo/1	MINATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	CONTAINER	18. SOLIDIFICATION OR STABILIZATION	14, CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT	INDIVIDUAL RADIO CONTAINER TOTAL	IOLOGICAL DESCRIPTION NUCLIDES AND ACTIVITY (A ; OR CONTAINER TOTAL AI ADIONUCLIDE PERCENT	END AND	AS-Cla AS-Cla Stabl AU-Cla Unstr
ID NUMBER(S)	Note (A)	(m3) (m3)	(kg)	mSvhr mrander	ALPHA	BETA- GAMMA	1	-(m3) (F13)	(000 (1022 0)	i	IF>0.1%	RADIONUCLIDES :	Cl/gm MSa	T mCl	8-Ctas C-Clas
124/1	•	0.21		<8.0000Œ-05	NP	3.3400E-06	39,29-H	0.20	NA	NONEMP	NP	IC-14 1.00	000E+01 5.0320E-0: 000E+01 5.0320E-0: 000E+01 2.5160E-0		AS
•		7.25	0,17	<8.000E-03	NP	2.0000E+02		7.35	. '			Subtotal	3.5224E-0	9.5200E-03	4
												Total	3.5224E-0	9.5200E-03	
												_ .		l	1
125/1	4	0.21	156.49	<8,0000E-05	1/85	3.34008-06	39, 29 H	0.20	NA	NONEMP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 5.0320E-0; 000E+01 5.0320E-0; 000E+01 2.5160E-0	1.3600E-03 1.3600E-03 6.8000E-03	SA B
	·	7.35	0.17	<8.000E-03	, NEP	Z-0000E+02		7.35		ŀ		Subtotal	3.5224E-0	9.5200E-03	4
							·			:		Total	3.5224E-0	9.5200E-03	
			ļ ·			[1		. [
126/1	•	0.21	156,49	<8.0000E-05	МЪ	3.3400E-08	39,29-11	0.20	NA	NONEMP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 5.0320E-02 000E+01 5.0320E-02 000E+01 2.5160E-0	1.3600E-03 1.3600E-03 6.8000E-03	AS
•	-	7.35	0.17	<8.000E-03	NP	2.0000E+02	,	7.35	1			Subtotal	3.5224E-01	9.5200E-03	4
												Total	3.5224E-Q1		
							,]
128/1		0.21	65.77	<5.0000E-05	NP	3.3400E-06	39-H	0.20	NA	NONE/NP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 1.6798E-02 000E+01 1.6798E-02 000E+01 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
		7.35	0.07	<8.000E-03	NP	2.0000E+02		7.35				Subtotal	1.1759E-01	3.1780E-03	1
·····												Total	1.1759E-01	3.1780E-03	
							[1
129/1	4	0.21	65,77	<8.0000E-05	ИР	3.3400E-08	39,E-HL	0.20	NA	NONEMP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	000E+01 1.6798E-02 000E+01 1.6798E-02 000E+01 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
	1	7.35	0.07	<8.000E-03	NP	2.0000E+02	l	7,35	i 1	ı l		Subtotal	1.1759E-01	3.1780E-03	.1

FORM 541A (10-96)

Envirocare of Utah, Inc.

2 MANIFEST NUMBER 4032-01-002

				CONTAINE		TE DESCR	PTION (CONTINU	IATION				•	3	. PAGE 15 OF :	24 PAGE(S)	
	DISPOSAL CO.	ITAINER DESC	OFTION							ON FOR EACH WAST						IBWASTE CLASSIFT
	1				·			PHYSICAL DESCR		14. CHEMICAL DE			ADIOLOGICA	LDESCRIPTION		CLASSIFT
S. CONTAINER IDENTIFICATION NUMBER! GENERATOR	CONTAINER DESCRIPTION (See Note 1 &	7, VOLUME (m3)	8. WASTE AND CONTAINER WEIGHT	SURFACE RADIATION LEVEL	CONTAL	FACE ENATION DD GII2 90 GII2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE			WEIGHT	INDIVIDUAL RADI CONTAINER TOT	IONUCLIDES AL; OR CON	S AND ACTIVITY (ME ITAINER TOTAL ACT LIDE PERCENT	q) AND IVITY	CATION AS-Class Stable AU-Class Unstabl B-Class C-Class
D NUMBER(S)	Note 1A)	(ft.5) (ft.5)	(leg)	mSwhr memin	ALPHA	GAMMA	<u> </u>	(FT3)	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		AGENT IF>0.1%	RADIONUCUDES	pCl/gm	MBq	mCl	C-Class (
•					·	ļ ,						Total		1.1759E-01	3.1780E-03	
139/1	4	0.21	158.49	<8,0000E-05	NP	3.3400E-08	39,29-11	0.20	NA	NONEMP	NP	C-14 1.0 H-3 1.0 Sr-90 5.0	00000E+0 00000E+0	5.0320E-02 5.0320E-02 2.5160E-01	1,3600E-03 1,3600E-03 6,8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.6000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	-1
												Total		3.5224E-01	9.5200E-03	1
140/1	4				ļ	<u>. </u>	39.29-11		NA.	NONE/NP		C-14 1.0	00000E+0	1 5.0320E-02	1.3600E-03	AS
		0.21	158,49	<8.0000E-05	NP	3.3400E-06		0.20	-		NP .	H-3 Sr-90 5.0	00000E+0	·		-1
		7.38	, 0.17	<8.000E-03	NP.	2.0000E+02		7.35		<u> </u>	<u> </u>	Subtotal		3.5224E-01	9.5200E-03	
		·							-			Total		3.5224E-01	9.5200E-03	
149/1	4	0.21	158.49	<8,0000E-05	NEP	3.3400E-68	39,29-11	0.20	NA	NONEMP	NP	C-14 1.0 H-3 1.0 Sr-90 5.0	0000E+0	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.36	0.17	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	.1
			L									Total		3.5224E-01	9.5200E-03	
			<u> </u>				20.00 14						onone : a		4 000AF 50	
145/1	1	0,21	156.49	<8.0600E-05	NP	3.3400E-08	39,29-H	0.26	NA	NONE/NP		C-14 1.0 H-3 Sr-90 5.0	0000E+01 0000E+01	5.0320E-02 6.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.36	0.17	≪.000E-03	, #P	2.0000E+02		7.38				Subtotal		3.5224E-01	9.5200E-03	ļ
												Total		3.5224E-01	9.5200E-03	
												<u> </u>				

FORM 541A (10-96)

- FORM 541A LINIFORM L

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

3 PAGE 16 OF 24 PAGE(S)

•1			· · · · · · · · · · · · · · · · · · ·	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	JATION) -					. 3	. PAGE 16 OF	24 PAGE(S)	
	DISPOSAL CON	TAINER DESC	UPTION					.PHYSICAL DESCR	WASTE DESCRIPTION	ON FOR EACH WAS 14. CHEMICAL DE			. RADIOLOGICA			16.WASTE CLASSIFI-
S. CONTAINER IDENTIFICATION NUMBER / GENERATOR ID NUMBER(5)	CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7, VOLUME, 	a. WASTE AND CONTAINER WEIGHT	SURFACE RADIATION LEVEL	CONTAN MBort dpm/1	FACE SINATION 100 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (F13)			WEIGHT	INDIVIDUAL (CONTAINER	RADIONUCLIDES	AND ACTIVITY (ME	Bq) AND TIVITY	CATION AS-Class / Stable AU-Class / Unstable B-Class E C-Class C
ID NUMBER(S)	MODE TA)	(n3)	(leg)	mSvihr mtem/hr	ALPHA	GAMMA		(F13)			LF>0.1%	RADIONUCLIDES	pCi/qm	MBo	mCi	•
15021	4	0.21	156.49	<8.0000E-05	NP	3,34008-06	39,29-11	0.20	NA	NONEMP	NP		1.00000E+0 1.00000E+0 5.00000E+0	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
•		7.35	0.17	. <8.000E-03	NP	2.0000E+02	ł	7,35			l. :	Subtotal		3.5224E-01	9.5200E-03	1
•						-		·				Total		3.5224E-01	9.5200E-03	
				L				<u></u>								<u> </u>
163/1	4	0.21	156,49	<8.0000E-05	NP	3.3400E-06	39,29-11	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	6.0320E-02	1,3600E-03 1,3600E-03 6,8000E-03	AS
•		7.35	0.17	<8.000E-03	MР	2.0000E+02	İ	7.35	Ì			Subtotal		3.5224E-01	9.5200E-03	1
								·				Total .		3.5224E-01	9.5200E-03	
167/11	4	0,21	158,49	<8.0000E-05	NP	3.3400E-08	39,29-H	0.20	-NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35		·		Subtotal		3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	
																_
168/1	4	0.21	156.49	<8,0000E-05	NP	3.3400E-06	39,29-11	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	II 8.0320F-02	1.3600E-03 1.3600E-03 6.8000E-03	AS
-		7.36	0.17	<8.000E-03	NP.	2.0000E+02		7,35				Subtotal		3.5224E-01	9.5200E-03	
							·		,	,		Total		3.5224E-01	9.5200E-03	

170/1	4	0.21	156.49	<8.0000E-05	NP	,3.3400E-06	39,29-H	0,20	NA	NONE/NP	.NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7,35	0.17	<8.0006-03	KФ	2,0000E+02		7.35			·	Subtotal		3.5224E-01	9.5200E-03	

FORM 541A (10-96)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

			•		TIASI	C IAN-HAII	LUI						1	3: PAGE 17 OF	24 PAGE(S)	•
···	DISPOSAL CO	TANER DESI	ROTEON	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	ATION)	WASTE RECEPION	IN FOR EACH WAS	E TYPE IN A	TUTANER		5 AGE 11 G1		He.WAS
	Litar Cort COI	1						PHYSICAL DESCRI	PTION	14. CHEMICAL DE	SCRIPTION	15	RADIOLOGIC	AL DESCRIPTION		CLASS
CONTAINER DENTIFICATION NUMBER/ GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	MBati	EINATION 00 cm2 00 cm2 .	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE			WEIGHT % CHELATING AGENT	INDIVIDUAL F CONTAINER	RADIONUCLIDE TOTAL: OR CO	ES AND ACTIVITY (MI NTAINER TOTAL AC CLIDE PERCENT		CATR AS-CE Stab AU-CE B-CE C-CE
ID NUMBER(S)	Note 1A)	(m3) (ft3)	(kg)	m\$v/trr mrem/trr	ALPHA	BETA- GAMMA		(FT3)			IF>0.1%	RADIONUCLIDES	pCl/gm	MBq	mCl	C-Cla
												Total		3.5224E-01		
•	1							•								
171/1	4	0.21	158,49	<0.0000E-05	122	3,3400E-06	39,29-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 5.0320E-02 01 5.0320E-02 01 2.5160E-01	1,3600E-03 1,3600E-03 6,8000E-03	A8
		7.36	0.17	<8.0008-03	MP	2.0000E+02		7.35				Subtotal		3,5224E-01	<u> </u>	,
												Total		3.5224E-01	9.5200E-03	,
	ļ <u> </u>						39,29-FJ		NA NA	NONE/NP		C-14	1 0000054	01 5.0320E-02	1,3600E-03	PAS
	1	· 0.21	156.49	<8.0000E-05	NP	3.34008-06	35,25-17	0.20	l ma	NONEMP	NP	H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	·	1.3600E-03 6.8000E-03	
	:	7,35	0.17	<8.0005-03	NP	2.0000E+02		7.35			<u> </u>	Subtotal		3.5224E-01	9.5200E-03	
							1					Total		3.5224E-01		j
						`	<u> </u>									
1741	4	0.21	155,49	<8.0000E-05	МЬ	1.3400E-08	29,29-H	0.20	NA .	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 6.0320E-02 01 6.0320E-02 01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8,000E-03	NР	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	<u>- </u>
												Total		3.5224E-01	9.5200E-03	
						<u> </u>										
181/1	1	0.21	65.17	<8.0000E-05	H2ª	23400E-08	39-H	0.20	NA	NONEMP	NР	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 1.6798E-02 01 1.6798E-02 01 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
		7,36	0,07	<8.000£-03	NP	2.0000E+02		7,35			· .	Subtotal		1.1759E-01	3.1780E-03	_
							ŀ					Total		1.1759E-01	3.1780E-03	
			1	l		ſ				l	i	1		1	<i>i</i> '	

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

3. PAGE 18 OF 24 PAGE(S)

	••			CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	(ATION)		·.	•	•	3.	PAGE 18 OF 2	•	•
	DISPOSAL CON	TAINER DESC	RIPTION						WASTE DESCRIPTION							16.WASTE CLASSIFI-
S. CONTAINER IDENTIFICATION NUMBER! GENERATOR	CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	.MBa/1	FACE ENATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 8 Note 2A)	CONTAINER	13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM/ CHELATING AGENT	WEIGHT	INDIVIDUAL I CONTAINER	RADIOLOGICAL RADIONUCLIDES A TOTAL: OR CONTA AND RADIONUCLI	AND ACTIVITY (MB	So) AND	CATION AS-Class A Stable AU-Class A Unstable
ID NUMBER(S)	Note (A)	(m3) (R3)	(kg)	mswhr membr	ALPHÁ	BETA- GAMMA	1		(000 11000 0)]	1F>0.1%	RADIONUCLIDES	pCVgm	MBq	mCl	8-Class 8 C-Class C
182/1	4	0.21	156,49	<8.0000E-05	NP	3,3400E-08	19,29-H	0.20	NA	NONE/NP	NP	C-14 H-3	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02	1.3600F-03	AS
•		7.36	0.17	<8.000E-03	NP	2.0000 E+02		7.36		.	·	Subtotal		3.5224E-01	9.5200E-03	
						·						Total		3.5224E-01	9.5200E-03	
												:			j	<u> </u>
189/1	.4	0.21	156.49	<8,0000E-05	NР	3.3400E-06	39,29 - H	0,20	NA.	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03	AS
		7,35	0,17	<8.000€-03	NP	2.00002+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
		-										Total		3.5224E-01	9.5200E-03	
		<u> </u>														
192/1	4	0.21	158.49	<8,0000E-05	NP	3.3400E-06	39,29-H	0.20	NA.	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.39	0.17	<8.000E-03	NP	2.0000E+02		7.35		<u></u>	-	Subtotal		3.5224E-01	9.5200E-03	<u> </u>
										,		Total		3.5224E-01	9.5200E-03	
									,							
195/1	4	0.21	292.57	<8.0000E-05	NP	3.34002-08	29,39-H	0.20	NA NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.36	0.32	<8.000E-03	NP	2.000 0E+0 2		7,36				Subtotal		7.0448E-01	1.9040E-02	
												Total		7.0448E-01	1.9040E-02	
198/1	4	0.21	292.57	<8.0000E-05	ΝP	3.3400E-08	29,39-H	0.20	NA	NONEMP		C-14 H-3 Sr:90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1,3600E-02	AS
	l	7.35	0,32	<8.000E-03	100	2,0000E+02	l	7.35	1			Subtotal	. !	7.0448E-01	1.9040E-02	l .

FORM \$41A (10-96)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

	·.														14 PACEIG)	
	UISPUSAL CUN	TAINER DESC	REPTION	CONTAINE	R AND WAS	TE DESCRI	PTION (CONTINI	(ATION)	WASTE DESCRIPTION	AN CAR HARMING	e successi a	ON PARISO		3. PAGE 19 OF 2	M PAGE(S)	
	_							PHYSICAL DESCR	PTION	14. CHEMICAL DE	SCRIPTION	ONTAINER 15, F	RADIOLOGIC	CAL DESCRIPTION		16.WASTE CLASSIFT
S. CONTAINER IDENTIFICATION NUMBER / GENERATOR ID NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) (#3)	B. WASTE AND CONTAINER WEIGHT (kg) (ton)	9. SURFACE RADIATION LEVEL mSv/re	10. SURF CONTAM MRohi domini		WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER ([1]3) (F73)	13, SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3)	CHEMICAL FORM CHELATING AGENT	WEIGHT % CHELATING AGENT IF>0.1%	INDMIDUAL RAI CONTAINER TO	DIONUCUO:	ES AND ACTIVITY IMB ONTAINER TOTAL ACT ICLIDE PERCENT	a) AND TVTY	CATION AS-Class Stable AU-Class Unstable B-Class C-Class
			(ton)	man/bc	ALPIDA	GAMMA			ļ	<u> </u>	1.0.7%	RADIONUCLIDES	pCl/gm	MBq	mÇi .	1
												Total		7.0448E-01	1.9040E-02	
205/1	4	0.21	292.67	<8.00000€-05	NP	3.1400E-08	29,39-H	0.20	NA	NONE/NP		C-14 H-3	.00000E+ .00000E+	+01 1.0064E-01 +01 1.0064E-01 +01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
•		7,35	0.32	≪8.000€-03	ИР	2.0000E+02		7.35			NР	Subtotal	:.00000E+	7.0448E-01	1.3600E-02 1.9040E-02	
	, at											Total		7.0448E-01	1,9040E-02	
208/1	4						29,39-41						*****			
		0.21	Z47.21	<8.0000€-05	NP	3.34008-06		0.20	NA .	NONE/NP	NP	C-14 H-3 Sr-90	.00000E+ .00000E+	61 8.3990E-02 61 8.3990E-02 61 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
		7.35	0,27	≪8.0000€-03	MP	2.0000E+02		7.35				Subtotal		5.8608E-01	1.5840E-02	
											•	Total		5.8608E-01	1.5840E-02	
2367	4	0.21	292.57	<1.0000E-04	NP	3.3400E-06	29,39-14	0.20	NA .	NONEMP		H-3 1.	.00000E+ .00000E+	01 1.0064E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7,35	0.32	<1.000년-02	NP	20000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	
								· 			j	Total		7.0448E-01	1.9040E-02	
		Ì					_									
238/1	4	0.21	247.21	<1,0000E-04	NP	3.3400E-06	29,39-H	0.20	NA .	NONEMP	1	C-14 1. H-3 1. Sr-90 5.	.00000E+0 .00000E+0	01 8.3990E-02 01 8.3990E-02 01 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	· AS
		7,35	0,27	<1.000E-02	NP	2.0000E+02		7.35				Subtotal .		5.8608E-01	1.5840E-02	
Ì	}											Total		5.8608E-01	1.5840E-02	
FORM 541A (10-95)																

FORM 541A (10-95)

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Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

				CONTAINE		TE DESCR	PTION CONTIN	IATION					3. PAGE 20 OF	24 PAGE(S)	
	DISPOSAL CON	TAINER DESC	RIPTION						WASTE DESCRIPTION			ONTAINER			16.WASTI
5. CONTAINER (DENTIFICATION NAMBER! GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	SURFACE RADIATION	_MBa/1	FACE MINATION 100 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	CONTAINER	13. SOLIDIFICATION OR STABILIZATION		WEIGHT	INDIVIDUAL RADION CONTAINER TOTAL:	NOGICAL DESCRIPTION UCLIDES AND ACTIVITY (M OR CONTAINER TOTAL AC DIONUCLIDE PERCENT	EQI AND	CLASSI CATIO AS-Clas Stable AU-Clas Unsta
ID NUMBER(S)	Note 1A)	(m3) (m3)		mSv/nr mem/hr	ALPHA	BETA- GAMMA	& NOTE 2A)	(FT3)	(586 NOR 3)		IF>0.1%	RADIONUCLIDES of	i/gm M8q	l mci	8-Class C-Class
2441	4	0.21		T	NP	3.3400E-08	29,39-H	0.20	NA	NONE/NP	NP	C-14 1.000	00E+01 6.6970E-02 00E+01 6.6970E-02 00E+01 3.3559E-01	1.8100E-03	AS
		7,35	0.22	<1.000E-02	NP	2.00005+02		7,35				Subtotal	4.6953E-01		
	·											Total	4.6953E-01		İ
					<u> </u>						,				<u></u>
248/1	4	0.21	247.21	<1,0000E-04	NP	3.3400E-06	29,39-H	0.20	NA	NONE/NP	NP	IH-3 1.000	00E+01 8.3990E-02 00E+01 8.3990E-02 00E+01 4.1810E-01	2.2700E-031	AS
		7.38	0.27	<1.000E-02	NP	2.0000E+02		7.35				Subtotal	5.8608E-01	1.5840E-02	
		·						·				Total	5.8608E-Q1	1.5840E-02	
~														·	
259/1	4	0.21	247.21	<1.0000E-04	NP	3,3400E-06	29,39-11	0.20	NA .	NONEMP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 8.3990E-02 00E+01 8.3990E-02 00E+01 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
		7,39	0.27	<1.000E-02	NP	2.0000E+02		7,35		· 		Subtotal	5.8608E-01	1.5840E-02	
] .					Total	5.8608E-01	1.5840E-02	
258/1	4	0.21	201,85	<1.0000E-04	NP	3,3400E-06	29,39-11	0.20	NA .	HONEINP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 6.6970E-02 00E+01 6.6970E-02 00E+01 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7.35	0.22	<1.000E-02	KP	2,0000E+02		7.36				Subtotal	4.6953E-01	1.2690E-02	
	,											Total	4.8953E-01	1.2690E-02	
								,				. 1			
279/1	4	0,21	65.77	<2.6000E-04	NP	3,3400E-06	39-H	0.26	NA	NONEMP		IH-3 11.000	00E+01 1.6798E-02 00E+01 1.6798E-02 00E+01 8.3990E-02	4.5400E-04	AS
	٠.	7.35	0.07	<2.600E-02	NP	2,0000E+02		7.35		, i		Subtotal	1.1759E-01	3.1780E-03	

FORM 841A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2 MANIFEST NUMBER 4032-01-002

				AIMOI	E MANII	ESI							2 2405 2405	TOAGETS)	
DISPOSAL CON	TAINER DESCR		CONTAINE	AND WAS	TE DESCRI	STION (CONTINU	ATION)	WASTE DESCRIPTION	N FOR EACH WAST	E TYPE IN C			3. FAGE 21 OF 2	_	IB.WASTE
G. CONTAINER DESCRIPTION (See Note 1 & Note 1 A)	7. VOLUMĖ	6. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	CONTAN _NBah dpm/h	ANATION 100 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE	PTION 13. SOLUTIFICATION OR STABILIZATION	14. CHEMICAL DES	WEIGHT WEIGHT CHELATING AGENT	15 INDIVIDUAL I CONTAINER	radionuclie Total; or c And radioni	DES AND ACTIVITY (MS CONTAINER TOTAL ACT UCLIDE PERCENT	q) AND MITY	CLASSIFI- CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
	1	(too)	memity	ALPHA	GAMMA				ì		RADIONACI IDES	pCl/gm	1.1759E-01	3,1780E-03	
4	0.21 7.35	65.77 Q.07	<8.0000E-05	NP NP	3,3400E-06 2,0000E+02	39-H	0.20 7.35	NA	NONE/NP	NP .	C-14 H-3 Sr-90 Subtotal	1.00000E 1.00000E 5.00000E	1.6798E-02 +01 1.6798E-02 +01 8.3990E-02 1.1759E-01	4.5400E-04 4.6400E-04 2.2700E-03 3.1780E-03	
							·				Total		1.1759E-01		
4	0.21 7.35			NP NP	3.3400E-06 2.0000E+02	29,39-4	0.20 7.38	NA .	NONEMP	KР	C-14 H-3 Sr-90 Subtotal	1.00000E	+01 6.6970E-02	1.8100E-03 1.8100E-03 9.0700E-03 1.2690E-02	
						·			•	·	Total	:	4.6963E-01	1.2690E-02	
•	0.21 7.35			NP NP	-	39-11	Q.26 7,25	NA ·	HONEMP	ΝP	C-14 H-3 Sr-90 Subtotal	1.00000E 1.00000E 5.00000E	+01 1.5798E-02 +01 1.6798E-02 +01 8,3990E-02 1.1759E-01	4.5400E-04 4.5400E-04 2.2700E-03 3.1780E-03	į.
											Total		1.1759E-01	3.1780E-03	
•	0.21 7.35			NP NP	3,3400E-08 2,0000E+02	29,39-H	0.28 7.35	NA	NONEMP	NP	C-14 H-3 Sr-90 Subtotal	1.00000E	+01 6.6970E-02	1.8100E-03 1.8100E-03 9.0700E-03 1.2690E-02	İ
											Total		4.6953E-01	1.2690E-02	
	G. CONTAINER DESCRIPTION (See Nate 1 & Note 1A)	6. 7. CONTAINER DESCRIPTION (See Nate 1 & (m3) (m3) (R2) (R2) (R2) (R2) (R2) (R2) (R2) (R2	UISPOSAL CONTAINER DESCRIPTION 6.	UISPOSAL CONTAINER DESCRIPTION 8.	UISPOSAL CONTAINER DESCRIPTION 9. 7. 8. WASTE AND CONTAINER DESCRIPTION (mg) (mg) (mg) (mg) (mg) (mg) (mg) (mg)	0. 7. 6. WASTE 9. 10. SURFACE CONTAINER NEW PLANT 12. 13. SURFACE CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER CONTAINER	UISPOSAL CONTAINER DESCRIPTION 8. 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FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2, MANIFEST NUMBER 4032-01-002

3. PAGE 22 OF 24 PAGE(S)

				CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	IATION					3.	PAGE 22 OF	Z4 FAGE(S)	*******
	OKSPOSAL COM	TAINER DESC	RIPTION		T	•		PHYSICAL DESCR	WASTE DESCRIPTION	ON FOR EACH WAST	ETYPE IN C	ONTAINER	S. RADIOLOGICAL	DESCRIPTION		GLASSIFI-
5. CONTAINER EDENTIFICATION NUMBER / GENERATOR	CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	M8a/1	INATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (F13)	SOLIDIFICATION OR STABILIZATION	CHEMICAL FORW CHELATING AGENT	CHELATING AGENT	CONTAINER	RADIONUCLIDES / TOTAL: OR CONT AND RADIONUCLI	AINER YOTAL ACI		CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
ID NUMBER(S)	Note 1A)	(m3) (ft3)	(log) (log)	mSvAr mremar	ALPHA	BETA-		(FT3)	. `	1	IF>0.1%	RADIONACLIDES	pCl/gm	MBq	mCl	
291/1	4	0.21	201.85	<1.00008-04	NP	3.3400E-08	29,39-H	0.20	NA	HONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	6.6970E-02 6.6970E-02 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7.35	0.22	<1.000E-02	NP	2.0000E+02		7,35		·		Subtotal		4.6953E-01	1.2690E-02	
		ļ										Total		4,6953E-01	1.2690E-02	
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292/1	4	0.21	201.85	<1.0000€-84	NР	3.3400E-08	29,39-H	0.20	NA	NONE/NP	NP.	H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	6.6970E-02 3.3559E-01	1.8100E-03 9.0700E-03	, A.S.
		7,35	0.22	<1.000E-02	NP	2.0000€+02		7.35				Subtotal		4.6953E-01	1.2690E-02	<u></u>
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296/1	4	0.21	65,77	<1.0000E-04	NP	3.3400E-08	39-11	0.20	NA	NOME/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.6798E-02 1.6798E-02 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
		7.35	0.07	<1.000E-02	NP	2.0000E+02		7.35				Subtotal		1.1759E-01	3.1780E-03	
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298/1	4	0.21	201.86	<1.000015-04	NP	9.3400E-08	29,39-H	0.20	NA .	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 6.00000E+01	6.6970E-02 6.6970E-02 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7.35	0.22	<1.000E-02	NP	2.0000E+02		7.35				Subtotal		4.6953E-01	1.2690E-02	
									}			Total		4.6953E-01	1.2690E-02	
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307/1	4	0.21	201.85	<8.0000E-05	NP	3.3400E-08	29,39-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	6.6970E-02 6.6970E-02 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7.35	0.22	<8.000€-03	NP	2.0000E+02		7.35				Subtotal		4.6953E-01	1.2690E-02	

FORM 541A (10-98)

FORM 541Å			U		I LOW-I WAST		RADIOACTI	VE		;		Envirocaré of Uta	ah, Inc. 2.	MANIFEST NI 4032-01-0		
	•												3.	PAGE 23 OF	24 PAGE(S)	
	DISPOSAL CO	TAINER DESC	MD114B	CUNTAINE	K ANU WAS	IF DESCR	PTION (CONTINI		WASTE DESCRIPTION	ON FOR EACH WAST	ETYPEINC	ONTAINER				H6.WAST
S. CONTAINER IDENTIFICATION NUMBER / GENERATOR ID NUMBER(S)	CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME	8. WASTE AND CONTAINER WEIGHT (kg)	B. SURFACE RADIATION LEVEL MSVAT	10. SURI CONTAN MBg/d dpm/1		11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (MS) (FT3)	13. SOLIDIFICATION OR STABILIZATION	CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT	INDIVIDUAL, R CONTAINER T	TOTAL; OR CONT AND RADIONUCL	AND ACTIVITY (MI FAINER TOTAL AC IDE PERCENT	Bq) AND TIVITY	CLASSII CATIO AS-Clas Stable AU-Clas Unstal B-Clas C-Clas
				1000		1 3000		·		 			pC8gan	MBq		
												Total		4.6953E-01	1.2690E-02	
308/1	4	0.21	65,77	<4.0000E-06	NР	3.3400E-08	39-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.6798E-02 1.6798E-02 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
		7.35	0.07	<8.000E-03	NP	2.0000E+02	ļ	7,35			<u> </u>	Subtotal		1.1759E-01	3.1780E-03	
										·		Total		1.1759E-01		
310/1	1	0.21	. 158.49	<8.0000E-05	мР	3.3400E-06	39,29-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0,17	<8,000E-03	NP	2.0000E+02	<u> </u>	7.35				Subtotal		3.5224E-01	9.5200E-03	
	ļ											Total		3.5224E-01	9.5200E-03	
311/1		0.21	156.49	<8.0000E-05	NP	3.3400E-06	39,29-61	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000€-03	MP	2.0800E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
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312/1	1						29.2541		NA NA	NONEMP	· .	C-14	1 000000	E Hanne AA	4 26005 55	AS
		0.21	156.48	<8.0000E-05	NP	3.3400E-06	-	0.20	154	languester.	NP		1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
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FORM 541A (10-96)

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-002

3. PAGE 24 OF 24 PAGE(S

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CONTAINER DENTIFICATION NUMBER() GENERATOR ID NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 1 & Note 1 A)	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	_MBa/1 dpm/1	FACE (INATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE	13. SOUDIFICATION	IN FOR EACH WAST 14. CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT	NDIVIDI (A)	RADIONUCLIDE	L DESCRIPTION S AND ACTIVITY (ME NTAINER TOTAL ACT LIDE PERCENT	Sa) AND	CLASS CATIC AS-CIO Stable AU-Cia Unist B-Cia C-Cta
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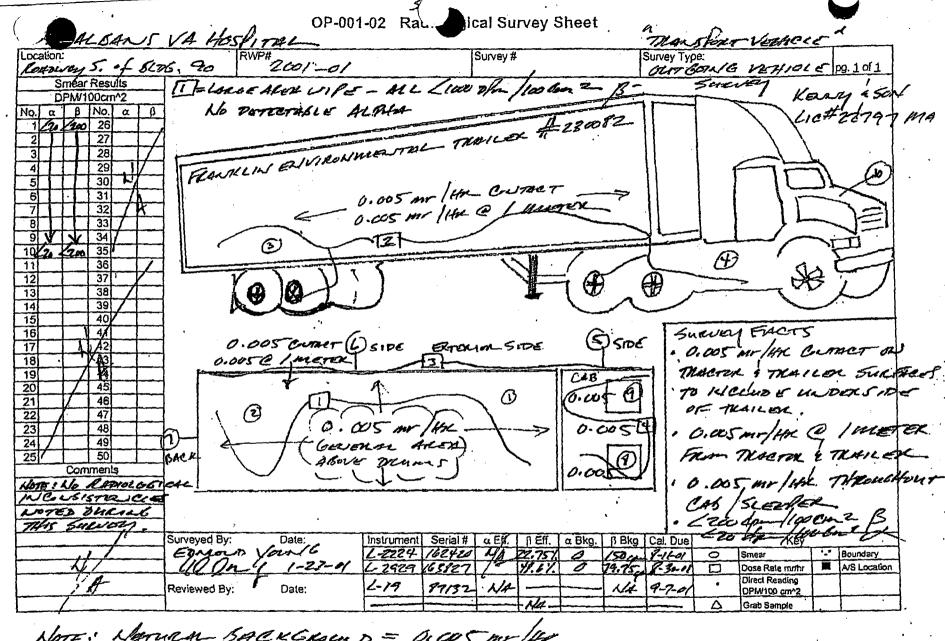
FORM 541A (10-86)

FORM 540	En	virocare of Utah, inc	S · SHIPP	ER - NAME AND FACILITY		<u> </u>	-	DI STOR ST	TO Hamm	1				8. MANIFEST NU	(CC)
1	EVEL RADIOACTIV	•	LE Army C	iorps Of Engliseers			- 1	45	ENT LD. HLAUBER 132-01-003	7, FOR	M 840 AND 540A	PAGE 1 C	F 7 PAGE(S)	(Use this number	ron all continuation
•	•	- .	10 South He	ward Street			-	Ţ	COLLECTOR		11 541 AND 541A 11 542 AND 542A		24 PAGE(S) None PAGE(S)	P2065) 4032-01	-003
VVASIE	E MANIFEST		Baltimore, 1	ID 21201-1715	•	•			PROCESSOR		STICHAL INFORM	MOTA	None PAGE(8)		
	PING PAPER		USER PERA	OT HUMBER	SHIPME 4932-01	ENT NUMBER	ER		GENERATOR TYPE			and Facility Address	······································	CONTACT Stapping and Receiv	Ang
1. EMERGENCY TELEPHONE MUMBER floor 1-804-425-8678	urla Area Code)	•	CONTACT				 - ,	IFI EPA	ONE NUMBER	Environ	are of Utah, Inc. Isposal Sile		•	TER EDUCATE NI BUR	R (Include Area Code)
ORGANIZATION			Mr. Hans	Honerlati				Inckede	Area Codel	Inherst	sto 84, Exit 49			1	3((1.432))
: Fainklin Environmental Services, Inc.						************	_1		102-018t	CEve, t	FT 84029			(436)884-0155	
1. IS THIS AN "EXCLUSIVE USE" SHIPMENT?	1. TOTAL NUMBER OF	: [ER Nama and Address Amormental Service					. NUMBER 4014188.	SIGNA	TURE - Authoriza	d consignes eclmowle	dying wasta mocial	DATE	
l	PACKAGES IDENTIFIES		185 industri		* .				1000	1					
YES YES	ON THIS MANIFEST	102	Wrentham, I	MA 02093			l, a	3 tippu 1/23/1	STATE OF	<u></u>	•		CERTIFICATION		
A DOES EPA REGULATED JUSTO	EPA MANUFEST NUMBER	<u>. </u>				<u> </u>			-	This is to	certify that the bar	rain named maleriais s od oribotes named name	re properly dessilled, o	lescribed, packaged, mad ins of the Department of T	sed, and inbeled and an rensportation. This also
WASTE RECUIRING A MO	EPA MANUFES I NUMBER		CONTACT Rab	Тезя			16	TELEPI Include 508-5	iONE NUMBER Area Code) 84-6151	certifies to disposal a	a descriped in so an the malerials a	cochauce mp pa tedi na crazzgay baccade	i, marked, and labeled frements of 10 CFR Pa	and are in proper conditions 20 and 61, or equivale	n for transportation and rt state regulations.
THES SEEPLESINY If "Yes," provide Manifest Number	, NA		SIGNATURE	- Authorized center activity	gladging waste	receipt		ATE		AUTHO	RIPED SIGNATO	Ré	TIME		DATE
T ves, provide management	İ		16	2./0/			L.	1-2	4-01.		HALP OF	corae	Passer	Fue esp	24 2000
11. LLB DEPARTMENT OF TRANSPORTATION	ON DESCRIPTION	12	13	14.					15.	ON DE	mar or i	16	77.	18 TOTAL WEIGHT	19. IDENTIFICATION
(Including proper shipping name, becard class and any additional information	, UN ID number,	DOT LABEL "RADIOACTIVE"	TRANSPORT INDEX	PHYSICAL AN CHEMICAL FOR	ED ED			NO.	IVIDLIAL HIJCLIDES		TOTALPA MBq .	VCKAGE ACTIVITY	LSA/SCO CLASS	(Ate abbooksje ruga) OB AOTTINE	NUMBER OF PACKAGE
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material, 7, UNI2916			<u></u>			Ĺ							1	FT3	
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Radioacilie tristerial, excepted packa material, 7, 11(12910	ge-limited quantity of	NA	NA	Solid MA		C-14	H-3		Sr-98	2	3510E-01	6,3540E-03	NA	245. LBS; 7.35 FT3	072
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WASTE SHIPMENT RECORD

City/State/Zip Baltimore, MD 21201		1. Work site (Generator): Name US Army Corps of Engineers - Baltimo Mailing Address CENAE-EN-HI. 10 South HOward	re Dist. Road		's Name an's VAECC		Owner ephone	
2. Remover's name and address: Franklin Environmental Services, Inc. 185 Industrial Road Wrentham, MA 02093 3. Waste Disposal Site WDS) Name Envirocare of Utah- Clive Disposal Site Mailing Address Interstate 80, Exit 49 CityState(Zip Clive, UT 84029 4. Name and address of responsible agency 5. Description of materials RQ. ASBESTOS, 9, NA2212, III RQ = 1LB (ONE POUND) 8. Special handling instructions and additional information (provided by generator.) Lingth Rough Roberts in proper condition for transport by highway according to applicable international and government regulations. NOTE: Generator must retain a copy of this form. Printed/typed name & title Signature Month Day Year Address and telephone no. 12. Discrepancy Indication space Rejected; Remover's telephone no. Roberts telephone no. WDS telephone no. (508) 384-6151 WDS telephone no. Additional information: Additional information: Remover's telephone no. Additional information: Additional information: Relephone no. Roberts telephone no. Additional information: Additional information: Roberts telephone no. Additional information: Additional information: Relephone no. Relephone no. Roberts telephone no. Additional information: Additional information: Additional information: Relephone no. Relephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Roberts telephone no. Ro	S	City/State/Zip Baltimore, MD 21201		001 1110	y 17.240	ŀ		
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ORIGINAL RETURN TO GENERATOR



NOTE: NATURAL BACKGROUND = DICOS mr/HE

OP-001

CABRERA SERVICES, INC.

Page 15 of 15

Radiological Sy

FORM 540 UNIFORM LOW-LE WASTE		rirocare of Utah, inc. E	U.S. Army Co CENAE-EN-H 10 South Hou		īY		В́Н	4032-01-003 COLLECTOR PROCESSOR	ER	7. FORM 540 AND 540/ FORM 541 AND 541/ FORM 542 AND 542/ ADDITIONAL INFOR	`	F 7 PAGE(S) 24 PAGE(S) None PAGE(S) Nane PAGE(S)	8. MANFEST NU (Use this numbe .pages) 4032-01	er on all continuation
SHIPF	ING PAPER		USER PERM	Y NUMBER		IPMENT NUMB	ER X	CENEDATORY	TYPE	9. CONSIGNEE - Name	and Facility Address		CONTACT Shipping and Recei	viaa
1-509-425-5678	de Area Code)		CONTACT: Mr. Hans I	fonoriah			TE (In	EPHONE NUMBER stude Area Code)	,	Envirocare of Utah, inc Clive Disposal Site Interatate 80, Exit 49 Clive, UT 84029	•			ER (Include Area Code)
ORGANIZATION Franklin Environmental Services, Inc.	•		6. CARRIE	R - Name and Address				A LD. NUMBER		SIGNATURE - Authoriz		deing unch maint	DATE	
2. IS THIS AN "EXCLUSIVE USE" SHIPMENT?	3. TOTAL NUMBER OF PACKAGES IDENTIFIED	D		ironmental Service				D084814136		- SIGNATIONE - AUDIOIZA	an consigner accionia	Ogrig Wasia racept	DATE	
YES .	ON THIS MANIFEST	102	Wrentham, N	A 02093				IPPING DATE		Yhla la ta andii ahad ma ta		CERTIFICATION	described and and	feed, and labeled and are
4. DOES EPA REGULATED WASTE REQUIRING A	EPA MANIFEST NUMBER		CONTACT Rob	Tors			TE (to	LEPHONE NUMBER clude Area Code) 608-384-6151	,	This is to certify that the fu in proper condition for tran certifies that the malerials disposal as described in 8	esportation according to are classified, package accordance with the requ	the applicable regulation, marked, and tabeled irements of 10 CFR P	case of the Department of I and are in proper condition arts 20 and 61, or equivale	Transportation. This also on for transportation and ent state regulations.
MANIFEST ACCOMPANY X NO THIS SHIPMENT?	NA NA		SIGNATURE	- Authorized carrier act	portladging u	raste receipt	DA	TE.		AUTHORIZED SIGNAT	IRE	TITLE	····	DATE /
If "Yes," provide Manifest Number			125	Zn. ()			1	24-01		ON BENDER OF		PREJECT.	ENAME	24 34101
U.S. DEPARTMENT OF TRANSPORTATION (Including proper shipping name, hazard class and any additional information	ON DESCRIPTION 1, UN ID number, 1	12, DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL CHEMICAL I			R	15. Individual Adionuclides		TOTAL P	16. PACKAGE ACTIVITY MCI	17. LSA/SCO CLASS	18, TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
material, 7, UN2910	dioactive material, excepted package-limited quantity of NA sterial, 7, UN2910					C-14	H-3	Sr-90		2.3510E-01	5.3540E-03	NA	245, LBS; 7.35 FT3	067
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	Unexpected Expo					LE: Upon accep	ptence at th	e disposal site by En	vitocar	re of Litah, Inc., and all app Kator and be vested in Env	stopriate regulatory auth	orities, title to the Was	te Meterial which conform	s to Generator's
1		Labels, Markings, etc	Inadequate	١.						kezor and de vested yn env Dat all data set forth in this		EL RADIOACTR/E W/A	STE MANIESST) are to a	and covert to
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INDEMBNIFICATION: Generator agrees to indemnify Envirocare of Utah, Inc., its officers, employees and agents against all losses and fisability whatsoever if such losses or liability results from the failure of the Wasta Material in conform in all material respects to the data supplied on the [UNIFORM LOW-LEVEL RADIOACTIVE WASTE WASTE] or if this shipment fails to meet the standards prescribed by the Department of Transportation or any governmental agency having jurisdiction over such matters.

FORM 540 (10-96)

Other

No Violations Detected on this Shipment.

FORM 540A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc. 8. MANIFEST NUMBER (Use this number on all continuation pages) 4032-01-003

PAGE 2 OF 7 PAGES

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U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information	12. DOT LABEL RADIOACTIVE	13. TRANSPORT INDEX	14, PHYBICAL AND CHEMICAL FORM	·	tno Radii	15. DIVIDUAL DNUCLIDES	TOTAL PAC	18, CKAGE ACTIVITY INCI	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19, IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	081
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA .	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645, LBS; 7.35 FT3	082
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645, LBS; 7.35 FT3	083
Radiosctive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	084
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 .FT3	085
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid INA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645, LBS; 7.35 FT3	086
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645, LBS; 7.35 FT3	087
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA .	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	097
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA NA	245. LBS; 7.35 FT3	098
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3 _	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	099
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	5.3540E-03	NA ·	245. LBS; 7.35 FT3	100
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245, LBS; 7.35 FT3	101
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid INA	C-14	H-3	Sr-90	2.3510E-01	8.3540E-03	NA	245. LBS; 7.35 FT3	104
Redicactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	8.3640E-03	NA .	245. LBS; 7.35 FT3	105
Redioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245, LBS; 7.35 FT3	106
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	B.3540E-03	NA	FT3	107
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA.	NA	Solid /NA	C-14	Н-3	Sr-90	2.3510E-01	B.3540E-03	NA .	246, LBS; 7.36 FT3	109
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345, LBS; 7.35 FT3	111

FORM 540A (10-95)

FORM 540A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc.

MANIFEST NUMBER (Use this number on all continuation pages) 4032-01-003

AGE 3 OF 7 PAGES

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 U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazalid class, UN ID number, and any additional information 	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM			15. DIVIDUAL ONUCLIDES	TOTAL PA	16. CKAGE ACTIVITY MCI	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3.	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	116
Radioactive material, excepted package-limited quantity of material, 7, UN2910	, ÑĀ	NA	Solid /NA .	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	117
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3,5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	118
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	122
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 F73	130
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA.	NA	Solid INA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	131
Radioactive material, excepted package-limited quantity of material, 7, UN2910	ŇĀ	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	132
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	133
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	134
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	Н-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	141
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	142
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	144
Radioactive material, excepted package-limited quantity of material, 7, UN2916	NA .	NA	Solid INA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345, LBS; 7.35 FT3	151
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA ·	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	152
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	153
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	154
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	'NA	345. LBS; 7.35 FT3	155
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	156

FORM 540À

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc.

MANIFEST NUMBER (Use this number on all continuation pages) 4032-01-003

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		-	TINGT AL EN (OOM)							PAGE 4 O	7 77020
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION [Including proper shipping name, hazard class, UN ID number, and any additional information	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT BNDEX	14. PHYSICAL AND CHEMICAL FORM		IND RADIO	15. INIDUAL DNUCLIDES	TOTAL PAR MBq	18. CKAGE ACTIVITY MCI	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	157
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA .	Solid /NA	. C-14	Н-3	Sr-90	3.5224E-01	9.5200E-03	NA NA	345. LBS; 7.35 FT3	158
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA .	Solid /NA	C-14	н-з	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	159
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA.	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	161
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	162
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA ·	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	173
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	176
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345, LBS; 7.35 FT3	177
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	178
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA NA	345. LBS; 7.35 FT3	179
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	184
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA ·	545. LBS; 7.35 .FT3	185
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	194
Radioactive material, excepted package-ilmited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	646. LBS; 7.35 FT3	199
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	200
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA ·	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645, LBS; 7.35 FT3	204
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA *	645. LBS; 7.35 FT3	206
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	207

FORM 54GA (10-96)



FORM 540A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc. 8. MANIFEST NUMBER (Use this number on all continuation pages) 4032-01-003

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U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information	12. DOT LABEL "RADIOACTIVE"	13, TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		INI RADI	15, DIVIDUAL ONUCLIDES	TOTAL PAC	18. KAGE ACTIVITY MCI	17. LSAVSCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	210
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	. н.з	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	213
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA .	545. LBS; 7.35 FT3	216
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	217
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	219
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	Н-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	221
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	224
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	225
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA.	NA	Solid /NA	C-14	н-3	Sr-80	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	228
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	н-3	Sr-90	7.0448E-01	1.9040E-02	NA .	645. LBS; 7.35 FT3	232
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	233
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645, LBS; 7.35 FT3	237
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	248
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	241
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	Н-3	Sr-90	4.6953E-01	1.2590E-02	NA NA	445. LBS; 7.35 FT3	243
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	246
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	Н-3	Sr-90	5.8608E-01	1.5840E-02	NA	545: LBS; 7.35 FT3	249
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA '	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	645. LBS; 7.36 FT3	250

FORM 540A (10-98

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION) Envirocare of Utah, inc. 8. MANIFEST NUMBER (Use this number on all continuation pages) 4032-01-003

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U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard deas, UN ID number, and any additional information)	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM			15. Dividual DNUCLIDES	TOTAL PAC	16. CKAGE ACTIVITY mCl	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA NA	545. LBS; 7.35 F73	251
Radioactive material, excepted package-limited quantity of material, 7, UN2910	- NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	ŅĀ	545. LBS; 7.35 FT3	252
Redioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	253
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA NA	545. LBS; 7.35 FT3	255
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	FT3	257
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	FT3	264
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	266
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345, LBS; 7.35 FT3	266A
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	· NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	645. LBS; 7.35 FT3	268
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA NA	345. LBS; 7.35 FT3	271
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445, LBS; 7.35 FT3	274
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1-2690E-02	NA	445. LBS; 7.35 FT3	275
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA NA	345. LBS; 7.35 FT3	276
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	1.1769E-01	3.1780E-03	ŅĀ	145. LBS; 7.35 FT3	283
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA .	545. LBS; 7.35 FT3	286
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	287
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NĀ	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	288
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NÃ	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	293

FORM 540A (10-98)

FORM 540A

Envirocare of Utah, Inc. FORM 540A (Use this number on all continuation 90005) 4032-01-003 **UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST** SHIPPING PAPER (CONTINUATION) 18. TOTAL PACKAGE ACTIVITY 13. TRANSPORT INDEX 12. DOT LABEL "RADIOACTIVE" 15. INDIVIDUAL RADIONUCLIDES 17. LSA/SCO CLASS 19. IDENTIFICATION 11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION 14. PHYSICAL AND CHEMICAL FORM (including proper shipping name, hazard class, UN ID number, and any additional information OR VOLUME (Use appropriate units) NUMBER OF PACKAGE Radioactive material, excepted package-limited quantity of Solid /NA 4.6953E-01 1.2690E-02 445, LBS; 7.35 294 C-14 H-3 NA material, 7, UN2910 FT3 Solid /NA 1.1759E-01 Radioactive material, excepted package-limited quantity of NA C-14 H-3 Sr-90 3.1780E-03 NA 145. LBS; 7.35 material, 7, UN2910 FT3 Redicactive material, excepted package-limited quantity of NA NA Solid /NA C-14 H-3 Sr-90 1.1759E-01 3.1780E-03 NA 145. LBS; 7.35 297 material, 7, UN2910 FT3 445. LBS; 7.35 FT3 Redioactive material, excepted package-limited quantity of Solid /NA Sr-90 4.6953E-01 1.2690E-02 NA C-14 H-3 material, 7, UN2910

FORM 540A (10-98)

FORM 541 Envirocare of Utah, Inc. 2. MANIFEST NUMBER NUMBER OF PACKAGES/ DISPOSAL CONTAINERS SPECIAL NUCLEAR MATERIAL (grama) 4032-01-003 NET WASTE **NET WASTE** TOTAL VOLUME WEIGHT 11.233 FL235 , Pu **UNIFORM LOW-LEVEL RADIOACTIVE** 3. PAGE 1 OF 24 PAGE(S) 17554.32 **WASTE MANIFEST** 102 NP NP ΝP NP 4. SHIPPER NAME 749.70 km 19.35 CONTAINER AND WASTE DESCRIPTION U.S. Army Corps Of Engineers SOURCE ALL NUCLIDES TRITIUM C-14 Tc-99 · L179 Additional Nuclear Regulatory Commission (NRC) Regularments for Control, Transfer and Disposal of Radioactive Waste 4.5437E+01 6.4917E+00 6.4917E+00 SHIPMENT ID NUMBER MBq КP (kgs) NA 4032-01-003 1,7545E-01 1.2279E+00 1.7545E-01 NA mCl (tons DISPOSAL CONTAINER DESCRIPTION ASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER
100 14. CHEMICAL DESCRIPTION 0.WASTE PHYSICAL DESCRIPTION 15. RADIOLOGICAL DESCRIPTION CLASSIFI CATION A8-Class A Stable AU-Class A a, WASTE SURFACE 12 APPROXIMATE 13 5 INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND SURFACE CONTAMBATION WASTE WASTE SOLIDIFICATION CONTAINER IDENTIFICATION CONTAINER VOLUME CONTAINER RADIATION M8a/100 cm2 don/100 cm2 DESCRIPTOR VOLUME(S) IN OR STABILIZATION CHEMICAL FORM %
MEDIA CHELATING AGENT CHELATING CONTAINER TOTAL: OR CONTAINER TOTAL ACTIVITY
AND RADIONUCLIDE PERCENT WEIGHT MINNER! (See Note 2 GENERATOR (See Note 1 & (ft3) & Note 2A) (See Note 3) AGENT IF>0.1% B-Class B C-Class C _mSv/hr Note 1A1 ALPHA RADIONUCLIDES pCirgm 1.00000E+01 1.00000E+01 5.00000E+01 9.0700E-04 9.0700E-04 4.5400E-03 3.3559E-02 3.3559E-02 1.6798E-01 AS 067/1 39,29-H NONE/NP 3 34662-02 H-3 Sr-90 0.21 111.13 <8.0000E-05 0.20 6.3540E-03 <R 000F-03 2.0000E+02 7 35 Subtotal 2.3510E-01 7.39 0.12 2.3510E-01 6.3540E-03 Total 1.00000E+01 1.00000E+01 5.00000E+01 9.0700E-04 070/1 39,29-H NONEMP AS 0.21 111.13 <8.00000E-05 3.3400E-06 0.20 H-3 Sr-90 3.3559E-07 9.0700E-04 4.5400E-03 Subtotal 2.3510E-01 6.3540E-03 7.35 0.12 <8.000E-03 Z.0000E+02 7.35 Total 2.3510E-01 6.3540E-03 39,29-11 NONEMP .00000E+01 9.0700E-04 NA 072/1 0.21 111.13 <8.0000E-05 3.3400E-08 0.20 H-3 Sr-90 3.3559E-02 1.6798E-01 9.0700E-04 4.5400E-03 Subtotal 2.3510E-01 6.3540E-03 7.35 0,12 <8.000E-03 2.0000E+02 7.35 Tota! 2.3510E-01 6.3540E-03 Note 1A: Bulk Packaging Description Codes Hote 2A: Specific Waste Descriptions NOTE 2: Wasta Descriptor Codes. (Choose up to three which predominate by volume.) Hote 3: Solidification and Stabilization Media Codes. [Choose up to NOTE 1: Container Description Codes. For containers/ (Choose all applicable codes.) three which predominate by volume.) For media meeting disposal site structural stability requirements, the numerical code must be followed: Choose one code as may be epolicable.) waste requiring disposal in approved structural over-packs the numerical code must be followed by "-OP." 20, Chercost 29. Demotition Rubble 38, Evaporator Bottoms/Studgesi A Condobs 21. Incinerator Ash 30. Cation Inneveluence Media Concentrates by "-S" and the media vendor and brand name must also be identified 31. Arion ion-exchange litedia 32. Missed Bed ion-exchange M 39. Compecible Tresh B intermedal In item 13, Code 100-NONE REQUIRED 22. Soli 23. Gas . Wooden Box or Crate 9 Demineralizer Dewatered Solid . Motel Box 10. Gas Cylinder C End-dump 11. Bulk, Unpackaged Waste 12. Unpackaged Components 24. Oil 25. Aqueous Liquid 41. Animal Carcass
42. Biological Material (except Combusticle Plastic Drum or Pail D Rott-off 33. Contuminated Foulton Solidification 34. Organic Liquid (except oil) Non-combustible 90. Cement 94. Vinyl Ester Styrene Metal Drum or Pall

26. Filter Media 27. Mechanical Filter 28. EPA or State

85. Glassware or Labware

36. Sealed Source/Device

37. Paint or Plating

43. Activated Material

59. Other, Describe in Item 11.

or additional page

Air Filtration Filters

Asbestos

91, Concrete

(encapsulation) 92. Bitumen

93. Vinyl Chlorid

99. Other, Describe

100. None Required.

in item 13, or

additional page

8. Fiberolass Tank or Liner FORM 541 (10-96)

Metal Tank or Liner

Polyethiene Tenk or Liner

13. High Integrity Container

Concrete Tent or Liner 19: Other, Describe in Item 6, Polyethere Tent or Liner or additional page.

UNIFORM LOW-LEVEL RADIOACTIVE **WASTE MANIFEST**

Envirocare of Utah, Inc.

2, MANIFEST NUMBER 4032-01-003

				CONTAINE	PAND WAS	TE DESCR	PTION (CONTINU	IATION	•				3. PAGE 2 OF 2	4 PAGE(S)	
	DISPOSAL CON	TAINER DESC	RIPTION	Y	S HILL TYPE	TE DESCR	ETICIA ILCIA IIAI		WASTE DESCRIPTION	ON FOR EACH WAST	E TYPE IN C	ONTAINER .	· · · · · · · · · · · · · · · · · · ·	16.0	WASTE
S. CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. Waste And Container Weight	9. SURFACE RADIATION LEVEL	10. SURF CONTAV _MBa/1 dpp/10	MINATION 00.om2	11. WASTE DESCRIPTOR (See Note 2	PHYSICAL DESCR 12. APPROXIMATE WASTE VOLUME(8) IN CONTAINER	13. SOLIDIFICATION OR STABILIZATION	CHEMICAL FORM CHEMICAL FORM CHELATING AGENT	WEIGHT	INDIVIDUAL RADIONI CONTAINER TOTAL;	DLOGICAL DESCRIPTION UCLIDES AND ACTIVITY (ME OR CONTAINER TOTAL ACT DIQUUCLIDE PERCENT	RI) AND. AS- STIVITY AU	LASSIFI- CATION S-Class / Stable AU-Class / Unstable R-Class F
ID NUMBER(S)	Nato 1A)	(ft3)	(kg) (kgn)	mSvite months	. ALPHA	BETA- GAMMA	1	(FT3)	(304 1005 3)		IF>0.1%	RADIONUCLIDES pc	Vom MBq	č	B-Class B C-Class C
073/1	4	0.21		-	NP	3.3400E-08	29,39-11	0.20	NA	NONEMP	N₽	C-14 1.000	00E+01 1.0064E-01 00E+01 1.0064E-01 00E+01 5.0320E-01	2.7200E-03 A	AS
		7.35	0.32	<8.000E-03	NP	2.0000E+02		7,35				Subtotal	7.0448E-01	1.9040E-02	
								-				Total	7.0448E-01	1.9040E-02	
078/1	4	0.21	292.57	<8.0000E-05	NP.	3.3400E-06	29,39-H	0.20	NA .	NONE/NP	NP NP	C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 1.0064E-01 00E+01 1.0064E-01 00E+01 5.0320E-01	2.7200E-03 AS 2.7200E-03 1.3600E-02	AS
		7.35	0.32	<8.000E-03	NP	2.0000E+02		7.35				Subtotal	7.0448E-01	1.9040E-02	
												Total	7.0448E-01	1.9040E-02	
·							29.39-11		NA NA			C-14 1.000	005:04 4 00645 04	0.70005-00	
077/1	4	0.21	292.57	<8.0000E-05	NEP	3,3400E-08	2,31-11	0.20	NA .	9M3MOM	NP	H-3 Sr-90 5.000	00E+01 1.0064E-01 00E+01 1.0064E-01 00E+01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.36	0.32	<8.000E-03	NIP	2.0000E+02		7.35				Subtotal	7.0448E-01	1.9040E-02	
								<u>.</u>	·			Total	7.0448E-01	1.9040E-02	
•															
079/1	4	0.21	292.57	<8.0000E-05	ΝР	3.3400E-08	29,39-H	0.20	NA	NONEMP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 1.0064E-01 00E+01 1.0064E-01 00E+01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	ıs
		7.35	0.32	<8.000E-03	NP	2.0000E+02		7,35				Subtotal	7.0448E-01	1.9040E-02	
												Total	7.0448E-01	1.9040E-02	
080/1	4						39,29-H		NA	NONE/NP		C-14 1.000i	00E+01 3.3559E-02	9.0700E-04 AS	AS
		0.21	111,13	-	NP	3.3400E-08		0.20			NP	H-3 Sr-90 5.0000	00E+01 3.3559E-02 00E+01 1.6798E-01	9.0700E-04 4.5400E-03	
E0914 5414 440 000		7.35	0.12	<8.000E-03	NP	2.0000E+02		7.35				Subtotal	2.3510E-01	6.3540E-03	

FORM 541A (10-96)

Envirocere of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

				0011741117						••		3. PAGE 3 OF 24	PAGE(S)			
	DISPOSAL COI	NTAINER DESC	RIPTION	CONTAINE	Y AND WAS	SIE DESCR	PTION (CONTINI		WASTE DESCRIPTI			ONTAINER				16.WASTE
5.	6.	7.	8. WASTE		. 10. ,SUR	CACE	11.	PHYSICAL DESCRI 12. APPROXIMATE		14. CHEMICAL DE	SCRIPTION	15.	RADIOLOGIC	AL DESCRIPTION		CLASSIFI- CATION AS-Class A
CONTAINER IDENTIFICATION NUMBER / GENERATOR	CONTAINER DESCRIPTION (See Note 1 &	VOLUME (ft3)	AND CONTAINER WEIGHT	LEVEL	CONTAI	MINATION 100 cm2 100 cm2	WASTE DESCRIPTOR (See Note 2 & Note 2A)	WASTE VOLUME(S) IN CONTAINER (m3) (F73)	SOLIDIFICATION	CHEMICAL FORM CHELATING AGENT	AGENT	CONTAINER	TOTAL: OR CO	ES AND ACTIVITY (MB INTAINER TOTAL ACT CLIDE PERCENT	DIAND	AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
(D NUMBER(S)	Note (A)	(113)	(kg)(ton)	mSvite	ALPHA	BETA- GAMMA		(F13)			IF>0.1%	RADIONUCLIDES	pCl/qm	MBq	mCl	C-Class C
				ļ	,							Total		2.3510E-01	6.3540E-03	
			1] '		1					·		1 1		
081/1	4	0.21	292.57	<8.0000E-05	NP	3.3450E-06	29,39-11	0,20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	01 1.0064E-01 01 1.0064E-01 01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.35	0.32	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	4
			<u> </u>									Total		7.0448E-01	1.9040E-02	
082/1	•	0.21	292.57	<8.0000E-05	NP	3.3400E-08	29,39-H	0.20	NA .	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	01 1.0064E-01 01 1.0064E-01 01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.38	0.32	<8.000E-03	NP	2.0000E+02		7,35				Subtotal		7.0448E-01	1.9040E-02	4
		· .]]		·	Total		7.0448E-01	1.9040E-02	
								,								
083/1	4	0.21	292.57	<8.0000E-05	NP	3.34002-08	29,39-Н	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.36	6.32	<8.000E-03	HP	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	1:
				<u> </u>								Total		7.0448E-01	1.9040E-02	
				<u></u>									<u></u>			
084/1	4	0.21	111.13	<8.0006E-05	NP	3.3400E-06	39,29-11	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	3.3559E-02 3.3559E-02 1 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12		NP	2.0000E+02		7.35				Subtotal		2.3510E-01	6.3540E-03	
									,			Total		2.3510E-01	6.3540E-03	
									<u></u>							
EDDM 644 A /40 DM																

FORM 541A (10-86)

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

				CONTAINE	PAND WAS	TE DESCO	PTION (CONTINU	IATIONS				•		3. PAGE 4 OF 24	PAGE(S)	
	DISPOSAL CON	TAINER DESC	NOTION	PARTMIT	ANU MAN	TE DENIEN	ETION ICENTING			N FOR EACH WAST	E TYPE IN C					16.WAST
5. CONTAINER EDENTIFICATION NUMBER/ GENERATOR	5. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3) (f3)	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL		SINATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION	CHEMICAL FORM	WEIGHT WEIGHT WEIGHT GHELATING AGENT	INDIVIDUAL R CONTAINER	RADIONUCLID	CAL DESCRIPTION ES AND ACTIVITY (MB ONTAINER TOTAL ACT ICLIDE PERCENT	(d) AND TIVITY	CLASSII CATIOI AS-Clas Stable AU-Clas Unstat B-Class
ID NUMBER(S)	Note 1A)	(63)	(kg)	mSvAr membr	ALPHA	BETA- GAMMA		(FT3)			IF>0.1%	RADIONUCLIDES	pCl/qm	MBq	mCI	B-Class C-Class
085/1	4	0.21	292.57	<8,0000E-06	NP	3.3400E-08	29,39-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	011 1.0064F-011	2.7200E-03 2.7200E-03 1.3600E-02	3 AS 3
		7.38	0.32	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	
							 					Total	t. I	7.0448E-01	1.9040E-02	
									NA NA	NONE/NP		C-14	1.00000E+	01 1.0064E-01	2.7200E-03	3 AS
088/1	4	0.21	292.57	<8.0000E-05	NEP	3.3400E-08	29,39-11	0.20	T TEA	MONEAR	NP	H-3 Sr-90	1.00000E+ 5.00000E+	01 1.0064E-01 01 5.0320E-01	2.7200E-03 1.3600E-02	2
		7.35	0.32	<8.000E-03	NIP	2.00005+02	<u> </u>	7.38				Subtotal		7.0448E-01	1,9040E-02	2
		i-										Total		7.0448E-01	1.9040E-02	2
				·					-NA			C-14	1.00000E+	01 1.0064E-01	2 72005 62	3 AS
08771	4	0.21	292,57	<8.0000E-05	NP	3.3400E-06	29,3 9-11	0.20	, MA	NONE/NP	NP		1.00000E+ 5.00000E+	01 1.0064E-01 01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	2 2
		7.35	0.32	<8.000E-03	MР	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	<u> </u>
												Total		7.0448E-01	1.9040E-02	
097/1	4 .	9.21	111.13	<8,0000E-05	NP	3.3400E-06	39,29-H	0.20	RA	NONE/NP		C-14 H-3	1.00000E+ 1.00000E+ 5.00000E+	01 3.3559E-02 01 3.3559E-02	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.38	0.12	<8.000E-03	NP	2.00002+02		7.36			NP	Sr-90 Subtotal	5.000006+	01 1.6798E-01 2.3510E-01	8.3540E-03	-I
												Total		2.3510E-01	6.3540E-03	
						,		,								
098/1	4	0.21	111.13	<8.D000E-05	NP	3.3400E-06	39,29-H	0.20	NA	NONE/NP		C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 3.3559E-02 01 3.3559E-02 01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	41
!		7.35	0.12	<8.000E-03	NP	2.0000E+02)	7.35	-	1		Subtotal		2.3510E-01	6.3540E-03	_1

- FORM 541A

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

				CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	ATTON)					3: PAGE 5 OF 2		
	DISPOSAL COM	VIAINER DESC	RIPTION					PHYSICAL DESCR	WASTE DESCRIPTION	IN FOR EACH WAS	E TYPE IN C	ONTAINER	LOGICAL DESCRIPTION	15	16,WAST
CONTAINER IDENTIFICATION NUMBER / GENERATOR	CONTAINER OESCRIPTION (See Note 1 & Note 1A)	7. VOLUME(m3)(ff3)	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL mSylfir	_MBo/1 dpm/1	FACE MINATION 100 cm ² 00 cm ²	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12 APPROXIMATE WASTE	13, SOLIDIFICATION OR STARB (ZATION		WEIGHT % CHELATING AGENT	INDIVIDUAL RADIONI CONTAINER TOTAL	LOGICAL DESCRIPTION JCLIDES AND ACTIVITY (M OR CONTAINER TOTAL AC DIONUCLIDE PERCENT	Bq) AND	CATIO AS-Class Stable AU-Clas Unsta B-Clas C-Clas
ID NUMBER(S)	NOIS 1A)	(113)	(kg) (len)	mouth:	ALPHA	GAMMA_		(F13)			IF>0.1%	RADIONUCLIDES . PC	/gm MBq	mCi '	C-Class
•								,				Total	2.3510E-01	6.3540E-03	
							L								
09971	4	0.21	111.13	<8.0000E-05	• ир	3.3400E-06	39,29-H	0.20	NA	NONEMP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 3.3559E-02 00E+01 3.3559E-02 00E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AŞ
		7,35	0.12	<8.000E-03	NP	2.0000E+02		7.35				Subtotal	2.3510E-01	6.3540E-03	
												Total	2.3510E-01	6.3540E-03	<u> </u>
]				
100/1	4	0.21	111,13	<8.0000E-05	NP	3.3400E-06	39,29-H	0.20	NA NA	NONEMP		C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 3.3559E-02 00E+01 3.3559E-02 00E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	, NP	2.0000E+02		7.35			NP	Subtotal	2.3510E-01	6.3540E-03	
								-				Total	2.3510E-01	6.3540E-03	
						:						· '		1	
101/1	4	0.21	111.13	<8.0000E-05	HP	3.3400E-08	39,29-H	0.20	NA	NONE/NP	1	C-14 1.0000 H-3 1.0000 Sr-90 5.0000	00E+01 3.3559E-02 00E+01 3.3559E-02 10E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	, NP	2.0000E+02		7.35			. ""	Subtotal	2.3510E-01		32#
												Total	2.3510E-01	6.3540E-03	
104/1	4	0.21	111,13	<8.0000E-06	NP	3.3400E-08	39,29-11	0.29	NA	HONE/NP	NEP	H-3 1.0000	0E+01 3.3559E-02 0E+01 3.3659E-02 0E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7,35	0.12	<4.000E-03	NDP	2.0000E+02		7.35				Subtotal	2.3510E-01	6.3540E-03	
												Total .	2.3510E-01	6.3540E-03	
FORM 541A (10-98)															

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

	••					- 1717-171							3. PA	GE 6 OF 24	4 PAGE(S)	
	DISPOSAL CO	NTAINER DESC	RUPTION	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINI		WASTE DESCRIPTION					****		16.WAST
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. 8URFACE RADIATION LEVEL			WASTE DESCRIPTOR (See Note 2 8 Note 2A)	PHYSICAL DESCRI 12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3)	13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORW CHELATING AGEN	WEIGHT	INDIVIDUAL RADIO CONTAINER TOTAL		ACTIVITY (MB		CATIO AS-Clas Stable AU-Clas Unsta
ID NUMBER(S)	Note 1A)	-(m3) (ft3)	(kg) (ton)	mSvAnr mrem/nr	ALPHA	BETA- GAMMA	1	(FT3)	(555,445,67		IF>0.1%		Ci/cm	MBq	mCi	B-Clas C-Clas
105/1	4	0,21	111.13	<8.0000E-05	NP	3,3400E-08	39,29-H	0,20	NA	HONEMP	NP	H-3 Sr-90 5.00	000E+01 3	.3559E-02 .3659E-02 .6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	
		7.35	0.12	<8.000E-03	NP	2.0000E+02		7.35	,		 	Subtotal .		2.3510E-01	6.3540E-03	-
			,	<u> </u>		<u> </u>		· · · · ·				Total	2	2.3510E-01	6.3540E-03	
109/1	4	0.21	111.13	<8.0000E-05	NP	3.3400E-08	39,29-H	0,20	NA NA	NONEMP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 3 000E+01 1	3.3559E-02 3.3559E-02 3.6798E-01	9.0700E-04 .9.0700E-04 4.5400E-03	:1
		7,35	0.12	<8.000E-03	NP	2.0000E+62		7,35				Subtotal	. 2	2.3510E-01	8.3540E-03	
												Total	2	2,3510E-01	8.3540E-03	
107/1	4 .	0,21	111.13	<8,000Œ-05	NP	3.3400E-06	39,29-H	0.20	NA NA	NONEMP	KIP	iH-3 i 1.00	000E+01 3 000E+01 3 000E+01 1	3.3559E-02 1.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	NР	2.0000E+02		7,35) ·			Subtotal	1	2.3510E-01	6.3540E-03	1
						-						Total	2	2.3510E-01	6.3540E-03	
															<u>.</u>	<u> </u>
109/1	4	0.21	111.13	<8.0000E-05	NP	3.3406E-06	39,29-H	0.20	NA	NONE/NP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 3 000E+01 3 000E+01 1	3.3559E-02 3.3559E-02 1.8798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	· NP	2.0000E+02		7.35				Subtotal	- 1	2.3510E-01	6.3540E-03	ı
												Total		2.3510E-01	6.3540E-03	
					,						<u> </u>					
111/1	4	0.21	156.49	<8,0000E-05	NP	3.3400E-08	39,29,1-HL	0.20	NA .	NONEMP	NP	lH-3 i 1.00	000E+01 5 000E+01 5 000E+01 2	.0320E-02 .0320E-02 .5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	PAS .
		7.35	0.17	<8.000E-03	, NP	2.0000E+02		7.25	100		1	Subtotal		.5224E-01	9.5200E-03	.1

FORM 541A (10-96)

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

						- 1817-2141							- 1 :	3. PAGE 7 OF 2	4 PÄGE(S)	
	DISPOSAL CON	TAINER DESC	RIPTION	CONTAINE	R AND WAS	E DESCR	PTION (CONTINI	JATION)	WASTE DESCRIPTO	ON FOR EACH WAS	TE TYPE IN C	ONTAINER				16,WASTE
5. CONTAINER IDENTIFICATION NUMBER/	CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	B. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL			11. WASTE DESCRIPTOR (See Note 2	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER	PTION 13. SOLIDIFICATION OR STABILIZATION MEDIA	14. CHEMICAL DE CHEMICAL FORM CHELATING AGEN	WEIGHT	15. INDIVIDUAL RA CONTAINER TO	ADIONUCLIDE OTAL: OR COI	AL DESCRIPTION S AND ACTIVITY (ME NTAINER TOTAL ACTIVITE PERCENT		CLASSIFI- CATION AS-Crass / Stable AU-Class / Unstable
GENERATOR ID NUMBER(S)	Note 1A)	<u>(m3)</u> (ft3)	(kg) (ton)	m8v/hr mrem/hr	ALPHA	BETA- GAMMA	, & Note 2A)	(m3) (FT3)	(See Note 3)		IF>0.1%	RADIONUCLIDES	pCi/gm	MBq	mCi_	B-Class 8 C-Class C
										,		Total		3.5224E-01	9.5200E-03	
116/1	4	0.21	156.49	<8.0000E-05	NP	3.3400E-06	39,29-H	0.20	NA .	NONE/NP	NP.	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	01 5.0320E-02 01 5.0320E-02 01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
:		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35]		"	Subtotal		3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	
117/1	4	0.21	158,49	<8.0000E-05	NP	1.3400E-08	39,29-H	0,20	NA NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	5.0320E-02 5.0320E-02 1 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS'
		7.35	0.17	<8.000E-03	NP	2.00005+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
				ļ	<u> </u>		<u> </u>		1			Total	•	3.5224E-01	9.5200E-03	
118/1	1					ļ	39,29-11		NA NA	NONE/NP	ļ	C-14 1	1.00000E+0	5.0320E-02	1.3600E-03	AS.
11001		0.21	158.49	<8.0000E-05	NP	3.3400E-06		0.20	ļ "¬	KONZAP	NP	H-3 Sr-90	1.00000E+0 5.00000E+0	6.0320E-02 2.6160E-01	1.3600E-03 6.8000E-03	
·	<u> </u>	7.35	0.17	<8.000E-03	NP	2.00002+02		7.35				Subtotal		3.5224E-01	9.5200E-03	-
			<u> </u>				[1			Total		3.5224E-01	9.5200E-03	
		ļ									<u>.</u>					
122/1	4	0,21	156.48	<8.0000E-05	NP	3.3400E-06	39,29-11	0.20	NA.	NONEINP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	5.0320E-02 5.0320E-02 1 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000€-03	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
		ļ		<u> </u>					1			Total		3.5224E-01	9.5200E-03	
}														'		

FORM 541A (10-98)

UNIFORM LOW-LEVEL RADIOACTIVE

WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

3. PAGE 8 OF 24 PAGE(

		••											3.	PAGE 8 OF 2	4 PAGE(S)	. ••
	DISPOSAL CO	NTAINER DESC	REPTION	CONTAINE	K ANLI WAS	HE DESCR	PTION (CONTINU			ON FOR EACH WAS	E TYPE IN	ONTAINER				16.WAS
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	CONTAINER DESCRIPTION (See Note 1 4	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	_MBq/1	FACE IINATION 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (M3) (FT3)	13. SOLIDIFICATION	14. CHEMICAL DE CHEMICAL FORM/ CHELATING AGENT	WEIGHT	INDIVIDUAL CONTAINER	5. RADIOLOGICAL RADIONUCLIDES RTOTAL: OR CONT AND RADIONUCLI	AND ACTIVITY (ME		CLAS CATI AS-CL Sist AU-CI Uns B-Cli C-Ci
ID NUMBER(S)	Note 1A)	<u>-(m3)</u> (ft3)	(kg)	m\$v/hr mom/hr	ALPHA	BETA- GAMMA]	(FT3)		l	IF>0.1%	RADIONUCLIDES	pCVqm	MBq	mci	.i
139/1	4	0.21	1		НР	3.3400E-08	39,29-11	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	_
							'					Total		3.5224E-01	9.5200E-03	
131/1	4	0.21	. 156,49	<8.0000E-05	NP	3.3400E-08	\$9,29-H	0.20	NA NA	NONE/NP	NP.	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	t I
•		7.36	0.17	<8.000E-03	NР	2.0000E+02		7.35			NF .	Subtotal	3.000002.01	3.5224E-01	9.5200E-03	.I
										•		Total		3.5224E-01	9.5200E-03	
132/1	-	0.21	156.49	<8.0000E-05	ИР	3.3400E-08	39,29-H	0.20	NA NA	NONE/NP	NP	C:14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7,35		· · · · · · · · · · · · · · · · · · ·		Subtotal		3.5224E-01	9.5200E-03	
		ļ				ļ						Total	·	3.5224E-01		
1391		0.21	156,49	<8,0000E-05	NP	3.3400E-08	39,29-11	0.20	NA	NONEMP		C-14 H-3	1.00000E+01 1.00000E+01	5.0320E-02 5.0320E-02 2.6160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AŞ
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35			NP	Sr-90 Subtotal	5.00000E+01	2.6160E-01 3.5224E-01	6.8000E-03 9.5200E-03	.I
												Total		3.5224E-01	9.5200E-03	
····		ļ ·								100000			4 000005:04	E MARKE DA	4 2000 02	
134/1	4	0.21	156.49	<8,0000E-05	NP	3.3400E-08	39, 29 H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02	J	7.35	1			Subtotal	İ	3.5224E-01	9.5200E-03	

FORM 541A (10-96)

Envirocare of Utah, Inc. 2. MANIFEST NUMBER 4032-01-003

3. PAGE 9 OF 24 PAGE(S)

			•	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	ATION)						PAGE 9 OF 2	4 PAGE(S)	
	DISPOSAL CON	ITAINER DESC	RIPTION .					PHYSICAL DESCRI	WASTE DESCRIPTION	ON FOR EACH WAS 14, CHEMICAL DE	TE TYPE IN C	ONTAINER	S. RADIOLOGICAL	DESCRIPTION		16.WASTE CLASSIFI-
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR ID NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL mSV/hr	_MBo/1 dpm/1	FACE ANATION 100 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION		WEIGHT	INDIVIDUAL CONTAINER	RADIONUCLIDES	AND ACTIVITY (ME		CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
ID MONDEIGO)	1102 174	(10)	(kg) (top)	- OCETAČIV	ALPHA	GAMMA	ļ	(1.0)			17-0.1%	RADIONUCLIDES	pCl/qm	MBq	mCi	1
		-					:					Total		3.5224E-01	9.5200E-03	
141/1	4	0.21	156.49	<8.0000E-05	NP	3.3400E-08	39,29-H	0.20	NA .	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35			<u></u>	Subtotal		3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	
142/1	4	0.21	156.49	<8.0000E-05	NP	3.3400E-06	39,29-H	0.20	, NA	NONEMP	!	C-14 H-3 C- an	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7,35			NP	Sr-90 Subtotal	5.00000E+01	2.5160E-01 3.5224E-01	9.5200E-03	
										·		Total	3	3.5224E-01	9.5200E-03	
144/1	4	0.21	158,49	<8.0000E-05	NP	3.3400E-06	39,29-11	0.20	NA NA	NONEMP	1	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	
181/1	4	0.21	156.49	<8.0000E-05	NP	3.34002-08	39,29-H	0,20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	6.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.00005+02		7,35				Subtotal		3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	
FORMA 444 (40 00)																

FORM 541A (10-95)

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

				àores :		- INIVIAL							3.	. PAGE 10 OF :	24 PAGE(S)	
	DISPOSAL CO	NTAINER DESC	RIPTION	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU		WASTE DESCRIPTE	ON FOR EACH WAS	E TYPE IN C	ONTAINER				16.WAST
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	5. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	10. SURI CONTAX _MBo/1 dpm/10		11. WASTE DESCRIPTOR (Sae Note 2 & Note 2A)	PHYSICAL DESCR. 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3)	13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM/ CHELATING AGENT	WEIGHT	INDIVIDUAL RADI CONTAINER TOTA	IONUCLIDES AL: OR CON	L DESCRIPTION AND ACTIVITY (MB ITAINER TOTAL ACT LIDE PERCENT	q) AND IVITY	CLASSIF CATION AS-Class Stable AU-Class Unstable
ID NUMBER(S)	Note 1A)	(m3) (ft3)	(kg)	mSv/hr	ALPHA	BETA- GAMMA	a Note 2A)	(m3) (F13)	(See More 3)]	IF>0.1%	RADIONUCLIDES	pCl/grn	· MBa I	mCi	B-Class C-Class
162/1	4	0.21	158.49]	NP	3.3400E-08	39,29-H	0.20	NA	NONE/NP	NP	C-14 1.0 H-3 1.0	00000E+01	5.0320E-02	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7,35				Subtotal	·		9.5200E-03	5
					<u> </u>							Total		3.5224E-01	9.5200E-03	
153/1	4			ļ			39,29-H		NA NA	NONE/NP		C-14 1.0	0000E+01	# # 0220 F 02	4 25005 02	<u> </u>
iga i	•	0.21	156.49	<8.0000E-05	NP	3.3400E-06	33,6370	0.20	na 	MONEMP	NP'	H-3 Sr-90 5.0	00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	≪7000E-03	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
					 	ļ				İ		Total ·		3.5224E-01	9.5200E-03	1
154/1	4		· ·	ļ	ļ		39.29-H		NA NA	110115015		C-14 · 1.0	0000E-04	6 00005 00	4 4600F 80	
1047		0,21	156.49	<8.0000E-05	NP	3.3400E-08	35,25-11	0.20	, ma	NONE/NP	NP	H-3 1.0 Sr-90 5.0	10000E+01 10000E+01 10000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7,35	9.17	48.000E-03	. мр	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	1
				ļ					ļ	[] ·		Total		3.5224E-01	9.5200E-03	1
	•															l
165/1	4	0.21	158.49	<0.0000E-08	NP	3.3400E-08	39,29-H	0.20	NA .	нонемр	NP	C-14 1.0 H-3 1.0 Sr-90 5.0	0000E+01 10000E+01 10000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35		· · · · · · · · · · · · · · · · · · ·		Subtotal		3.5224E-01	9.5200E-03	.1
		·					[~					Total		3.5224E-01	9.5200E-03	1
														-		
156/1	4	0.21	156.49	<8.0000E-05	NP	3.3400E-08	39,29-H	0.20	NA *	NONE/NP 	MP	C-14 1.00 H-3 1.00 Sr-90 5.00	0000E+01 0000E+01 0000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	A\$
		7,35	0.17	<8.000E-03	NP	2,0000E+02	ł	7.35	l			Subtotal			9.5200E-03	.1

FORM 541A (10-96)

FORM 541A			U	NIFORI		LEVEL I	RADIOACTI	VE				Envirocare of L	itah, inc. 2	. MANIFEST NI 4032-01-0		
				CONTAINE		•	PTION (CONTINU	IATION)				•	3	. PAGE 11 OF	24 PAGE(S)	
	DISPOSAL CON	TAINER DESC	REPTION						WASTE DESCRIPTION	ON FOR EACH WAS 14. CHEMICAL DE	E TYPE IN C			DECODED TO		H6.WASTE
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	CONTAINER DESCRIPTION OSee Note 1 &	7. VOLUME (m3)	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	MBo/1	FACE ENATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 8 Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13, SOLIDIFICATION OR STABILIZATION		WEIGHT % CHELATING	INDIVIDUAL	5. RADIOLOGICA RADIONUCLIDES TOTAL: OR CON AND RADIONUCI	AND ACTIVITY (ME	Bq) AND FIVITY	CATION AS-Class A Stable AU-Class A Unstable
ID NUMBER(S)	Note 1A)	(m3) (ft3)	(kg) (tan)	mSv/hr	ALPHA	BETA- GAMMA		(FT3)	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		AGENT IF>0.1%	RADIONUCLIDES	pCl/gm	MBq	mCi	B-Class B C-Class C
			-									Total		3.5224E-01	9.5200E-03	
157/1	4				<u> </u>	<u> </u>	39,25-H		NA	NONE/NP		C-14	1.00000E+0	1 5 03205-02	1 3600E-03	AS
19(1)	*	0.21	166.49	<8.0000E-05	NP	3.3400E-06	- water-11	0.20	```	I WASH	NP	H-3 Sr-90	1.00000E+0 5.00000E+0	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7,35				Subtotal		3.5224E-01	9.5200E-03	
	•											Total		3.5224E-01	9.5200E-03	
												·	<u> </u>		<i>:</i>	
158/1	4	0.21	158.49	<8.0000E-05	NP	3.3400E-08	59,29-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	5.0320E-02 6.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8,000E-03	NP	2.00005+02		7.35	<u> </u>			Subtotal		3.5224E-01		
						ļ						Total		3.5224E-01	9.5200E-03	
	·			,						<u></u>						
159/1	4	0.21	158.49	<8.0000E-05	ΝР	3.3400E-08	39,29-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	A8
		7,35	0.17	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	J
												Total		3.5224E-01	9.5200E-03	
161M	4	0.21	158,49	<8.0000E-05	NP	3.340015-06	39,29-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	.1
												Total		3.5224E-01	9.5200E-03	
									1							

FORM 541A (10-95)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

													•	3. PAGE 12 OF	24 PAGE(S)	
		DISPOSAL CON	TAINER DESCR	EPTION	CONTAINE	AND WAS	TE DESCR	PTION (CONTINI		WASTE DESCRIPTO						16.WASTE CLASSIFI-
IDENT	INTAINER INFICATION IMBER /	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME ((m3)	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	10. SURF CONTAM <u>MBatti</u> dpm/10	INATION 00 cm2	VASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(8) IN CONTAINER (m3) (FT3)	19. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT % CHELATING AGENT	INDIVIDUAL RADIOI CONTAINER TOTAL	OLOGICAL DESCRIPTION IUCLIDES AND ACTIVITY (M DR CONTAINER TOTAL AC IDIONUCLIDE PERCENT		CATION AS-Class A Stable AU-Class A
	UMBER(S)	Note 1A)	<u>(m3)</u> (fi3)	(kg) (ton)	mSv/hr mem/hr	ALPHA	BEYA- GAMMA		(FT3)	,		IF>0.1%		Olygm MBq	mCi	B-Class B C-Class C
182/1		4	0.21	159,49	-	NP	3.3400E-08	39,29-H	0.20	NA .	NONE/NP	NP	H-3 Sr-90 5.00	000E+01 5.0320E-02 000E+01 5.0320E-02 000E+01 2.5160E-01	6.8000E-03	
 			7.35	0.17	<8.000E-03	MP	2.0000E+02		7.35				Subtotal Total	3.5224E-01 3.5224E-01	9.5200E-03 9.5200E-03	
173/1		4						39,29-H		NA NA	NONE/NP		C-14 1.00	000E+01 5.0320E-02	1.3600E-03	AS
1/-4/1			0.21	156,49	 	NP	3.3400E-06	33,25-1	0.20	"-	NONEAP	NP	H-3 Sr-90 5.00	000E+01 5.0320E-02 000E+01 2.5160E-01	·	
			7,35	0.17	<6,0006-03	NP	2.0000E+02		7.35			ļ <u>.</u>	Subtotal	3.5224E-01	9.5200E-03	
												. 	Total	3.5224E-01	9.5200E-03	
176/1		4	0.21	156.49	<8.0000E-05	NP	3.3400E-06	39,29-H	0.20	NA	NONE/NP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 5.0320E-02 000E+01 5.0320E-02 000E+01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		·	7.35	0.17	<8.000E-03	NP	2.0000E+0Z		7.35				Subtotal	3.5224E-01	9.5200E-03	<u> </u>
								 					Total	3.5224E-01	9.6200E-03	
'		_														ŀ
117/1		4	0.21	158,49	<8,0000E-05	NP	3,3400E-06	59,29-H	0.20	NA .	NONE/NP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	100E+01 5.0320E-02 100E+01 5.0320E-02 100E+01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
			7.35	0.17	<8.000E-03	NP	2.0000E+02	<u> </u>	7.35				Subtotal	3.5224E-01	9.5200E-03	
												<u> </u>	Total	3.5224E-01	9.5200E-03	
											·					<u> </u>
178/1		4	0.21	156.49	<8.0000E-05	NP	3.3400E-08	39,29-H	0.20	NA	NONEMP	N₽	C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 5.0320E-02 000E+01 5.0320E-02 00E+01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
			7,35	0.17	<8.00015-03	ND	2.0000E+02		7,35				Subtotal	3.5224E-01	9.5200E-03	

FORM 541A (10-98)



Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

3. PAGE 13 OF 24 PAGE(S)

				CONTAINE	D AND WAS	TE DECCO	IPTION (CONTINI	IATION					3.	PAGE 13 OF	24 PAGE(5)	
	DISPOSAL CO	NTAINER DESC	RIPTION	T	1	UE DESIGN	THE TRANSPORT		WASTE DESCRIPTION	N FOR EACH WAS	E TYPE IN C	ONTAINER		222200000000		18,WAST
5. CONTAINER IDENTIFICATION NUMBER! GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3) (f(3)	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	_MBq#	MNATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCR 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION		WEIGHT % CHELATING AGENT	INDIVIDUAL RAI CONTAINER TO	DIONUCLIDES	DESCRIPTION AND ACTIVITY (ME FAINER TOTAL ACT IDE PERCENT	IQ) AND FIVITY	CATIO AS-Clas Stable AU-Clas Unstal B-Clas C-Clas
ID NUMBER(S)	Note 1A)	(103)	(kg) (ion)	mSv/hr mrem/hr	ALPHA	BETA- GAMMA		(F13)		<u> </u>	IF>0.1%	RADIONUCLIDES	pCl/gm	MBq	mCi	C-Class
							·					Total	•	3.5224E-01	9.5200E-03	
							İ	ĺ								ŀ
179/1	4	0.21	156.49	<8.0000E-05	NP	3.3400E-06	39,29-11	0.20	NA	NONE/NP	МP	C-14 1. H-3 1. Sr-90 5.	.00000E+01 .00000E+01 .00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35			· .	Subtotal		3.5224E-01	9.5200E-03	
•						· .						Total .		3.5224E-01	9.5200E-03	
														·		<u> </u>
184/1	•	0.21	155,49	<8.0000E-05	NP	3.3400E-06	39,29-H	0,20	NA	NONE/NP	NP	C-14 1. H-3 1. Sr-90 5.	.00000E+01 .00000E+01 .00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7,38	0.17	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	ľ
		ļ														
185/1	4	0.21	247.21	<8.0000E-05	NP	3.3400E-06	29,39-11	0,20	NA.	NONE/NP	NP	C-14 1. H-3 1. Sr-90 5.	.00000E+01 .00000E+01 .00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
		7.35	0.27	<8.000E-03	NP	2.00005+02		7.35				Subtotal	·	5.8608E-01		, I'
												Total .		5.8608E-01	1.5840E-02	
											ļ				.	
194/1	4	0.21	292.57	<8.0000E-05	NP	3,3400E-08	29,39-H	0.20	. NA	NONEMP	NP	C-14 1. H-3 1. Sr-90 5.	.00000E+01 .00000E+01	1.0084E-01 1.0064E-01 6.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.38	0.32	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		7.0448E-01		.I
												Total T		7.0448E-01	1.9040E-02	
	1		1		1.				ŀ	I	l [']	1		1	, !	1

FORM 541A (10-98)

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

3. PAGE 14 OF 24 PAGE(S)

				CONTAINE	R AND WAS	TE DESCR	IPTION (CONTINL	IATION)	<u></u>				3.	PAGE 14 OF	24 PAGE(S)	
	DISPOSAL COM	TAINER DESC	RIPTION					PHYSICAL DESCRI		ON FOR EACH WAS 14. CHEMICAL DE			RADIOLOGICAL	DESCRIPTION		16.WASTE CLASSIFI
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3)(f(3)	. B. WASTE AND CONTAINER WEIGHT	SURFACE RADIATION LEVEL	MBq/1 dpm/1	IINATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Hote 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (F13)	SOLIDIFICATION	CHEMICAL FORM/ CHELATING AGENT	CHELATING	1 CONTAINER	RADIONUCLIDES TOTAL: OR CONT AND RADIONUCLI	AND ACTIVITY (ME FAINER TOTAL ACT IDE PERCENT	Bq) AND TIVITY	CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
ID NUMBER(S)	Nate 1A)	(113)	(kg)	mSv/hr mrem/hr	ALPHA	BETA- GAMMA		(+13)	<u> </u>	<u> </u>	IF>0.1%	RADIONUCLIDES	pCl/gm	MBq	mCl	
199/1	4	0.21	292.57	<8.0000E-05	NP	3.3400E-08	29,39-H	0,20	NA NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.35	0.32	<8,000E-03	NP	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	
	ļ								}	ļ		Total		7.0448E-01	1.9040E-02	
· L							<u> </u>									
200/1	4	0.21	292.57	<8.0000E-05	NP	2.3400E-06	29,39-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS:
	• •	7.35	0.32	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	.,
				<u> </u>					}	<u> </u>		Total		7.0448E-01	1.9040E-02	
·																
204/1	4	0.21	292.57	<8.0000E-05	. МР	3.3400E-06	29,39-H	0.20	NA NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS-
		7.35	0.32	<8.000E-03	NP	2.0000E+02		7,35				Subtotal		7.0448E-01	1.9040E-02	
												Total		7.0448E-01	1.9040E-02	
				<u> </u>				÷.		<u> </u>					-	
206/1	1	0.21	292.57	<8.0000E-05	MP	3.3400E-06	29,39-H	0.20	NA .	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7,35	0.32	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	
												Total		7.0448E-01	1.9040E-02	
20771	4	0.21	292.57	<8.0000E-05	NP	3.3400E-08	29,39-H	0.28	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7,35	0,32	<8.000E-03	NP	2.000012+02		7.35				Subtotal		7.0448E-01	1.9040E-02	ı

FORM 541A (10-96)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

3. PAGE 15 OF 24 PAGE(S)

				CONTAINE	D AND WAS	TE DESCR	PTION (CONTINU	IATIONI					13	3. PAGE 15 OF 2	24 PAGE(5)	
	DISPOSAL CON	TAINER DESC	RIPTION	CL/M PANAC	AND WAS	TE DESCR	- HON ICONTINI		WASTE DESCRIPTION							16.WASTE CLASSIFI
6. CONTAINER IDENTIFICATION NUMBER/ GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3) (h3)	8, WASTE AND CONTAINER WEIGHT	8. SURFACE RADIATION LEVEL	dpn/10		11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT % CHELATING AGENT	INDIVIDUAL RAD CONTAINER TO	DIONUCLIDES TAL; OR CON	AL DESCRIPTION S AND ACTIVITY (MB NTAINER TOTAL ACT LIDE PERCENT		CATION AS-Class Stable AU-Class Unstab B-Class C-Class
ID NUMBER(S)	Note 1A)	(ns)	(kg) (lon)	utempt w\$wpt	ALPHA	GAMMA		(7.15)			IF>0.1%	RADIONUCLIDES	oCVqm	MBq	mCi	1 CC
												Total		7.0448E-01	1.9040E-02	
•							1				ļ		•	1 1		
210/1	4	0.21	247.21	<8.0000E-05	NP	3,3400E-08	29,39-H	0.20	HA .	NONEJNP	NP	C-14 1. H-3 1. Sr-90 5.	00000E+0 00000E+0 00000E+0	01 8.3990E-02 01 8.3990E-02 01 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
	·	7.35	0.27	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		5.8608E-01	1.5840E-02	.1
												Total		5.8608E-01	1.5840E-02	
1									·					.		Ė
213/1	4	0.21	292.57	<8.0000E-05	ΝР	3.3400E-06	29,39-H	0.26	NA.	NONE/NP	NP	C-14 H-3 Sr-90 5.	00000E+0 00000E+0	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	A\$
		7,35	0.32	<8.009E-03	NP	2.0000E+02		7.35				Subtotal ,		7.0448E-01	1.9040E-02	<u> </u>
												Total		7.0448E-01	1.9040E-02	
218/1	4	0.21	247.21	<8.00005-65	NP	3.3460E-06	29,39-11	. 0.20	NA	NONE/NP	NP	C-14 1. H-3 1. Sr-90 5.	00000E+0	11 8.3990E-02 11 8.3990E-02 11 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	31
		7.36	0.27	<8.000E-03	MP	2.0000E+02		7,35				Subtotal		5.8608E-01	1.58401.02	
												Total		5.8608E-01	1.58401:-02	
•							l					:		.		
217/1	4	0.21	156.49	<8.0000E-05	ΝР	3.3400E-06	39,29-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90 5.	00000E+0	71 5.0320E-02 71 5.0320E-02 71 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7,38				Subtotal		3.5224E-01	9.5200E-03	- l
												Total .	. -	3.5224E-01	9.5200E-03	
	1	1	1		1	1	1		1	I.	j	1 1		f 1		1

FORM 541A (10-98)

FORM 541A

FORM 541A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2, MANIFEST NUMBER 4032-01-003

3. PAGE 16 OF 24 PAGE(S)

				CONTAINE	D AMO INAO	TE DESCO	IPTION (CONTINE	IATIONS					3.	PAGE 16 OF	24 PAGE(S)	
	DISPOSAL CO	HAINER DESC	RIPTION	LAINLAINE	ANUL WAS	HE HEALK	T. A. A. A. A. A. A. A. A. A. A. A. A. A.		WASTE DESCRIPTION	ON FOR EACH WAS	E TYPE IN C	ONTAINER				16.WASTE
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	8. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL			11. WASTE DESCRIPTOR (See Note 2 8 Note 2A)	PHYSICAL DESCRI 12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3)		14. CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT	INDIVIDUAL RAD CONTAINER TO	IONUCLIDES	DESCRIPTION AND ACTIVITY (ME TAINER TOTAL ACTIVE PERCENT		CLASSIFI CATION AS-Class Stable AU-Class Unstable B-Class I C-Class
ID NUMBER(S)	Note 1A)	(ft3)	(kg)	mSv/hr mcem/hr	ALPHA	BETA- GAMMA	Ī	(FTS)		1	IF>0.1%	RADIONUCLIDES	pCl/gm	MBq	mCl .	J
219/1	4	0,21	292.57	<8,0000E-05	NP	3.3400E-08	29,39-H	0,20	NA	NONE/NP	NP	C-14 1.0 H-3 1.0 Sr-90 5.0	00000E+01 00000E+01 00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1,3600E-02	AS .
,		7.35	0.32	<8.000E-03	NP	2.0000E+02		7,35				Subtotal	<u> </u>	7.0448E-01	1.9040E-02	
							1					Total	,	7.0448E-01	1.9040E-02	
· · · · · · · · · · · · · · · · · · ·					<u> </u>							0.44	00000E+01	1.0064E-01	2.7200E-03	AS
224 M		0.21	292.57	<1.2000E-04	NP	3.3400E-08	29,39-H	0.20	NA "	NONEMP	NP	G-14 H-3 Sr-90	00000E+01 00000E+01	1.0064E-01 5.0320E-01	2.7200E-03 1.3600E-02	AS
		7.35	0.32	<1,200E-02	NP	2.0000E+02		7.36				Subtotal	·	7.0448E-01	1.9040E-02	
		<u>.</u>						<u> </u>				Total	•	7.0448E-01	1.9040E-02	
					ļ		29,39-H	ļ	NA NA	NONEMP		C-14 1.	00000E+01	1 00845 04	2.7200E-03	100
22411	1	0.21	292.57	<8.0000E-05	NP	3.3400E-08		0.20	""	NONENP	NP	H-3 Sr-90	00000E+01	1.0064E-01 5.0320E-01	2.7200E-03 1.3600E-02	. 7.3
· _ 		7,35	0,32	<8.000E-03	NP	2,0000E+02		7.35			<u> </u>	Subtotal		7.0448E-01	1.9040E-02	
	ļ				ļ	ļ	_					Total	•	7.0448E-01	1.9040E-02	
				<u> </u>										ii	<u> </u>	
225/1	4	0.21	292.57	<8.0000E-05	NP	3,3400E-06	29,38-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	00000E+01 00000E+01 00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS ·
		7.35	0.32	<8.000E-03	NP	2.0000E+02		7.35			<u></u>	Subtotal		7.0448E-01	1.9040E-02	
•					<u></u>		1				}	Total	!	7.0448E-01	1.9040E-02	
				ļ. <u></u>	·											
228/1	4	0.21	158,49	<1,30008-04	NP	3.3400E-06	39,29-H	0.20	NA	NONEMP	NP	lH-3 1.0	00000E+01 00000E+01 00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.38	0.17	<1.JUUE-02	NP	2.0000E+02		7,35				Subtotal		3.5224E-01	9.5200E-03	

FORM 541A (10-96)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

						E MAIN	•		٠.			•		3. PAGE 17 OF	24 PAGE(S)	
	DISPOSAL COI	NTAINER DESC	RUPTION	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINI		WASTE DESCRIPTION	ON FOR EACH WAST	E TYPEIN C	ONTAINER				16.WAS
E. CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	B. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	MBa/1	INATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 8 Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (RT3)	13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT	INDIVIDUAL CONTAINER	RADIONUCLID	CAL DESCRIPTION ES AND ACTIVITY (ME ONTAINER TOTAL ACT ICLIDE PERCENT	(NO) AND	CLASS CATIC AS-Cla Stabi AU-Cla Unsta B-Cla
ID NUMBER(S)	Note 1A)	(113)	(kg) (ton)	mSv/hr mrem/hr	ALPHA	BETA- GAMMA		(FT3)	,	<u></u>	(F>0,1%	RADIONUCLIDES	pCl/qm	MBq	mC) .	B-Clas C-Clas
										ŀ		Total		3.5224E-01	9.5200E-03	4
	1	<u> </u>	ļ ·		ļ 		<u> </u>			}	}					ŀ
232/1	4	0.21	292.57	<8.0000E-05	ИР	1.3400E-08	29,39-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 1.0064E-01 01 1.0064E-01 01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS 2
		7.35	0,32	<8.000E-03	ΝР	2.0000E+02		7.35			.	Subtotal		7.0448E-01	1.9040E-02	<u>i</u>
												Total		7.0448E-01	1.9040E-02	
								<u> </u>			·				·	
233/1	4	0,21	- 292.67	<8.0000E-05	ИР	3.3406E-06	29,39-11	0.20	NA .	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 1.0064E-01 01 1.0064E-01 01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.35	0.32	<8.000E-03	N.P	2.0000E+02		7.36				Subtotal		7.0448E-01	1.9040E-02	-1
												Total		7.0448E-01	1.9040E-02	ž
			<u> </u>				1									
237/I	1	0.21	292.57	<1.0000E-04	NP	3,3400E-06	29,38-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 1.0064E-01 01 1.0064E-01 01 6.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	3 AS
		7.35	0.32	<1.000E-02	NP	2.0000E+02		7,35				Subtotal	ļ	7.0448E-01	1.9040E-02	2 , ,,,
-												Total		7.0448E-01	1.9040E-02	į
										ĺ	,					
240/1	4	0.21	201.85	<1.0000E-04	NP	3.3400E-08	29,39-11	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 6.6970E-02 01 6.6970E-02 01 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7.35	0.22	<1.000E-03	NP	2.0000E+02		7,35	·			Subtotal		4.6953E-01	1.2690E-02	-1
, 												Total		4.6953E-01	1.2690E-02	
	1		1	·	1		1			Į			Ì	1 1		1

FORM 541A (10-85)

FORM 541A

FORM 541A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

		-		CONTAINE		TE DESCR	ETION (CONTINU	IATION)		·• , · ·			1	3. PAGE 18 OF	24 PAGE(S)	
	DISPOSAL CO	NTAINER DESC	RIPTION						WASTE DESCRIPTA	ON FOR EACH WAST	TE TYPE IN C	CONTAINER				IB.WA
_	1	1 _	,	1] .			PHYSICAL DESCR	PTION	14. CHEMICAL DE	SCRIPTION	15.	RADIOLOG	SICAL DESCRIPTION] CLAS
5. CONTAINER IDENTIFICATION NUMBER! GENERATOR	CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3) (ft3)	8. WASTE AND CONTAINER WEIGHT	9, SURFACE RADIATION LEVEL	CONTAL MBg/1	FACE AINATION 00 cm2	41, WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	SOLIDIFICATION OR STABBLIZATION	CHEMICAL FORM CHELATING AGENT	WEIGHT	CONTAINER T	TOTAL: OR C	DES AND ACTIVITY (ME CONTAINER YOTAL ACT JUCLIDE PERCENT	iq) AND IVITY	CA AS-C Str AU-C
ID NUMBER(S)	Note 1A)	(ft3)	(kg) (lon)	mSv/hr mrem/hr	ALPHA	BETA- GAMMA		(FT3)			IF>0.1%	RADIONUCLIDES	pCl/gm	MBq	·mCi	B-C
241/1		0.21	158,49	<1.0000E-04	NP	3.3400E-08	39,29-H	0,20	NA	NONE/NP	NP	C-14 H-3	1.00000E 1.00000E 5.00000E	+01 5.0320E-02 +01 5.0320E-02		AS
		7.35	0,17	<1.000E-02	NP	2.0000E+02	• .	7.36				Subtotal		3.5224E-01	9.5200E-03	٠.
		ļ										Total		3.5224E-01	9.5200E-03	
243H	4						29,39-H		NA .	NONE/NP		C-14	1.00000E	+01 6.6970E-02	1.8100E-03	AS
		0.21		<1.0000E-04	NP	3.3400E-06		0.20			NP	H-3 Sr-9p	1.00000E 5.00000E	+01 6.6970E-02 +01 3.3559E-01	1.8100E-03 9.0700E-03	
<u> </u>		7.35	0.22	<1.000E-02	NP	2.0000E+02		7.35		`		Subtotal		4.6953E-01	1.2690E-02	1
		<u> </u>		· ·								Total	•		1.2690E-02	
	·					<u> </u>	<u> </u>		<u> </u>					· -		1
246/1	1	0.21	201.85	<1.0000E-04	NP	3.3400E-06	29,39-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E 1.00000E 5.00000E	+01 6.6970E-02 +01 6.6970E-02 +01 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7.35	0.22	<1.000E-02	NP	2,0000E+02		7.35	<u> </u>			Subtotal		4.6953E-01	1.2690E-02	-1
												Total		4.6953E-01	1.2690E-02	
249/1	4	0.21	247.21	<1.0000E-04	NP	3.3400E-08	29,38-H	0.20	NA	NONEMP		C-14 H-3 Sr-90	1.00000E	+01 8.3990E-02	2.2700E-03	AS
		7,35	0.27	<1.000E-02	. NP	2.0000E+02		7.35			NP	Sr-90 Subtotal	5.00000E	+01 8.3990E-02 +01 4.1810E-01 5.8608E-01	2.2700E-03 1.1300E-02 1.5840E-02	
												Total		5.8608E-01	1.5840E-02	-
250/1		0,21	247.21	<1.0000E-04	NP	3.3400E-06	29,39-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E 1.00000E 5.00000E	+01 8.3990E-02 +01 8.3990E-02 +01 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	
	}	7.35	0.27	<1.000E-02	NР	2.0000E+02		7.35				Subtotal		6.8608E-01	1.5840E-02	.i

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

				CONTAINE	R AND WAS	RTE DESCR	IETION (CONTINI	IATION	-				3.	PAGE 19 OF	24 PAGE(S)	
	DISPOSAL CO	TAINER DESC	RIPTION		· · · · · · · · · · · · · · · · · · ·				WASTE DESCRIPTION	ON FOR EACH WAS	E TYPE IN C	ONTAINER				18.WASTE
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3) (f3)	8. WASTE AND CONTAINER WEIGHT	8. SURFACE RADIATION LEVEL	_MBati	AINATION 100 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 '& Note 2A)	PHYSICAL DESCR 12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (F13)	13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT	INDIVIDUAL CONTAINEI	IS. RADIOLOGICAL RADIONUCLIDES R TOTAL: OR CONT AND RADIONUCL	AND ACTIVITY (MI	Bg) AND TIVITY	18.WASTE CLASSIFI CLASSIFI CATION AS-Class Stable AU-Cless Unstable 8-Class E C-Class
ID NUMBER(S)	Note 1A)	(f(3)	(kg)	mSvAsr memAr	ALPHA	BETA- GAMMA		(F13)			IF>0.1%	RADIONUCLIDES	pCi/gm	MBq	mCl	C-Class C
												Total		5.8608E-01	1.5840E-02	
									1	ł		·				
25171	4	0.21	247.21	<1,0000E-04	ND	3.3400E-08	29,39-14	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
	1	7,35	0.27	<1.000E-02	NP.	2.0000E+02		7.35				Subtotal	1	6.8608E-01	1.5840E-02	. 6
												Total		5.8608E-01	1.5840E-02	
	}	İ	ļ		İ	ļ			Į.	İ						`
252/1	4	0.21	247.21	<1,0000E-04	· NP	3.3400E-00	29,38-H	0.20	NA NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
		7.35	0.27	<1.000E-02	NDP	2.0000E+02		7.35				Subtotal	0.000002.701	5.8608E-01	1.5840E-02	.1
	1	j				1	ĺ			_		Total		5.8608E-01	1.5840E-02	
•											ļ			İ		1
263/1	4	0.21	247.21	<1.0000E-04	NDP	3.3400E-08	20,39-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
		7.35	0.27	<1.000E-02	NP	2.0000E+02		7,35				Subtotal		5.8608E-01	1.5840E-02	. [
												Total ·		5.8608E-01	1.5840E-02	
	İ							j								
255/1	4	0.21	247.21	<1.0000E-04	NР	3.3400E-06	29,39-H	0,20	NA NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 6.00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
		7,38	0.27	<1.000E-02	NР	2.0000E+02		7.35				Subtotal		5.8608E-01	1.5840E-02	. 2
												Total .		5.8608E-01	1.5840E-02	
]	l														1
FORM 541 A (10-98)		·						<u> </u>						أييسبب		

FORM 541A (10-96)

FORM 641A

FORM 541A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

				CONTAINE	D AND MA	TE DECCE	IPTION (CONTINI	IATIONII			•		. 3	, PAGE 20 OF	24 PAGE(S)	
	DISPOSAL COL	TAINER DESC	RIPTION	CONTRACT	CAND HAS	TE DESCR	- CONTINU		WASTE DESCRIPTE	ON FOR EACH WAS	TE TYPE IN C	ONTAINER				16.WASTE
S. CONTAINER. IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION [See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	: MBo/1	INATION 00 cm2 00 cm2	WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCR 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION		WEIGHT	INDIVIDUAL RA CONTAINER TO	DIONUCLIDES	L DESCRIPTION AND ACTIVITY (ME ITAINER TOTAL ACT LIDE PERCENT		CLASSIF CATION AS-Class Stable AU-Class Unstab B-Class
ID NUMBER(S)	Note 1A)	_(m3) (ft3)	(kg)	mSv/hr mrem/hr	ALPHA	BETA- GAMMA		(FT3) -]		IF>0.1%	RADIONUCLIDES	pCVgm	MBq	mCi_	B-Class I C-Class I
257/1	4	0.21	201.85		NP	3.3400E-08	29,39-H	0.20	NA	NONE/NP	NP	C-14 11	.00000E+0	6.6970E-02 6.6970E-02 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7.35	0.22	<1.000E-02	NP	2.00005+02		7.35	·			Subtotal		4.6953E-01	1.2690E-02	
	ĺ											Total		4.6953E-01	1.2690E-02	
								, .				C-14 1	000005.0	4 4 670015 00	7 F400E 04	AS
264/1	∱. 4	0.21	65.77	<1,0000E-04	NP	3.3400E-06	-29-H	0.20	NA	NONE/NP	NP	H-3 Sr-90	.00000E+0 .00000E+0	1 1.6798E-02 1 1.6798E-02 1 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
		7,36	0.07	<1.0008-02	NP	2.0000E+02		7.35			<u> </u>	Subtotal '		1.1759E-01	3.1780E-03	
						·]					Total	:	1.1759E-01	3.1780E-03	
			<u> </u>													
288/1	4	0.21	158,49	<1.0000E-04	NDP	3.3400E-06	39,29-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	.00000E+0 .00000E+0	5.0320E-02 1 5.0320E-02 1 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	i f
·		7,35	0,17	<1.000E-02	NP	2.0000E+02		7.35		<u> </u>		Subtotal		3.5224E-01	9.5200E-03	
					<u></u>		1					Total		3.5224E-01	9.5200E-03	1
						<u> </u>							~			
266A/1	1	0.21	158.49	<1.0000E-04	МР	3.3400E-06	39,29-H	0.20	NA .	NONE/NP	NP	C-14 1 H-3 1 Sr-90 5	.00000E+0 .00000E+0 .00000E+0	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	
		7,35	.0.17	<1.000E-02	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
· 						<u> </u>			•			Total		3.5224E-01	9.5200E-03	· ·
												<u> </u>				
288/1	4	0.21	247.21	<1.0000E-04	MP	3.3400E-06	29,39-H	. 0.20	NA.	NONE/NP	NP	H-3 1	.00000E+0 .00000E+0 .00000E+0	1 8.3990E-02	2.2700E-03 2.2700E-03 1.1300E-02	AS
	1	7.35	0.27	<1.000E-02	NEP	2.0000E+02		7.25]]	Subtotal		5.8608E-01	1.5840E-02	Į.

FORM 541A (10-98)

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

3. PAGE 21 OF 24 PAGE(S

				CONTAINE	D AND WAS	TE DECCD	PTION CONTINU	IATION)				••	3	. PAGE 21 OF		
	DISPOSAL CO	NTAINER DESC	RIPTION	CONTAIN	AND MAS	TE DEOLIA	FILORICONTINE		WASTE DESCRIPTION	IN FOR EACH WAS	ETYPEINC	ONTAINER				16.WAST
5. CONTAINER IDENTIFICATION NUMBER / - GENERATOR	CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9 SURFACE RADIATION LEVEL		ENATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (M3) (FT3)	13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT	INDIVIDUAL RA CONTAINER TO	DIONUCLIDES OTAL: OR CON	L DESCRIPTION AND ACTIVITY (MI TAINER TOTAL AC LIDE PERCENT	Bq) AND	CATIO A3-Clas Stable AU-Clas Unsta B-Clas C-Clas
ID NUMBER(S)	Note 1A)	(m3) (h3)	(kg) (ton)	mSv/hr mrem/hr	ALPHA	BETA- GAMMA		(FT3)			IF>0.1%	RADIONUCLIDES	pCi/gm	MBq	mCi	C-Clas
	:						·			:		Total		5.8608E-01	1.5840E-02	
271n	4	0.21	158,49	<8.0000E-05	MP	3.3400E-06	39,2 9-1 1	0.20	NA NA	NONEMP	NP	C-14 1 H-3 1 Sr-90 5	1.00000E+0 1.00000E+0 5.00000E+0	5.0320E-02 1 5.0320E-02 1 5.0320E-02 1 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7,35	0.17	<8.000E-03	NP	2.0000E+02		7.35			"	Subtotal		3.5224E-01		-1
										·		Total		3.5224E-01	9.5200E-03	
2741	4	0.21	201,85	≪8.0000E-05	, NP	3.3400E-06	29-H	0.20	NA	NONEMP	NP .	1 1	1.00000E+0 1.00000E+0 5.00000E+0	1 6.6970E-02 1 6.6970E-02 1 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7,35	0.22	<8.0008-03	NP	2.0000E+02		7.35				Subtotal		4.6953E-01		<u>.</u>
									,			Total		4.6953E-01	1.2690E-02	
275/1	4	0.21	201.85	<8.0000E-05	NP	3.34008-06	29,39-H	0.20	NA .	NONEINP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 3.00000E+0	1 6.6970E-02 1 6.6970E-02 1 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7,35	0.22	<8.000E-03	NP	2.0000E+02		7,35				Subtotal		4.6953E-01		. 71.2
•							<u> </u>					Total		4,6953E-01	1.2690E-02	4
										· ·						
<i>21</i> 6/1	4	0,21	156,49	<8.0000E-05	NP	3.3400E-06	39,29-H	6.20	NA .	NONEMP	МP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	5.0320E-02 6.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
ļ <u></u>		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.38				Subtotal		3.5224E-01	9.5200E-03	1
_						<u> </u>						Total		3.5224E-01	9.5200E-03	4
ı						1	l .	1	j							

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Envirocare of Utah, Inc.

Total

C-14 H-3 Sr-90

Total

C-14 H-3 Sr-90

Subtotal

Subtotal

NP

NP

2. MANIFEST NUMBER 4032-01-003

3. PAGE 22 OF 24 PAGE(S)

4.6953E-01

3.5224E-01

3.5224E-01

6.6970E-02 6.6970E-02 3.3569E-01

4.6953E-01

1.00000E+01 1.00000E+01 5.00000E+01 5.0320E-02 1.3600E-03 5.0320E-02 1.3600E-03 2.5160E-01 6.8000E-03

1.2690E-02

9.5200E-03

9.5200E-03

1.8100E-03 1.8100E-03 9.0700E-03

1.2690E-02

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION (CONTINUATION) CLASSIFI-CATION AS-Class A Stable AU-Closs A PHYSICAL DESCRIPTION 12. APPROXIMATE 13. 14. CHEMICAL DESCRIPTION 8. WASTE 9. SURFACE SURFACE 13.
SOLIDIFICATION
OR STABILIZATION CHEMICAL FORM:
MEDIA CHELATING AGENT CHELATING CONTAINER AND CONTAMINATION WASTE WASTE INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBd) AND CONTAINER CONTAINER WEIGHT RADIATION VOLUME(S) IN CONTAINER (m3) (F13) CONTAINER TOTAL: OR CONTAINER TOTAL ACTIVITY
AND RADIONUCLIDE PERCENT IDENTIFICATION VOLUME MBo/100 cm2 DESCRIPTOR NUMBER / GENERATOR ID NUMBER(S) (See Note 2 & Note 2A) Unstable (See Note 1 & Note 1A) (See Note 3) AGENT B-Class B C-Class C m\$v/hr BETA-ALPHA GAMMA RADIONUCLIDES мёд 1.6798Е-02 4.5400E-04 4.5400E-04 2.2700E-03 283/1 NA NONE/NP 0.21 65.77 <8.0000E-05 3.3400E-08 0.20 H-3 Sr-90 NP Subtotal 1.1759E-01 3.1780E-03 7.35 0.07 <8.0008-03 2,0000E+02 7.35 Total 1.1759E-01 3.1780E-03 2.2700E-03 2.2700E-03 1.1300E-02 8.3990E-02 8.3990E-02 4.1810E-01 C-14 H-3 Sr-90 286/1 29,39-H NA NONEMP 247.21 <1.0000E-04 3.3400E-08 0,21 6.20 5.8608E-01 1.5840E-02 7.38 0.27 <1.000E-02 2.0000E+02 7.35 Subtotal 5.8608E-01 1.5840E-02 Total 1.00000E+01 1.00000E+01 5.00000E+01 C-14 H-3 Sr-90 6.6970E-02 6.6970E-02 3.3559E-01 29,39-H NOME/NP 287/1 NA 0.21 201.85 <1.0000E-04 3.3400E-06 0,20 NP Subtotal 4.6953E-01 1.2690E-02 7,35 0.22 <1.000E-02 2.0000E+02 7.35

NA

NA

0.20

7.35

0.20

7.35

NONE/NP

NONEMP

39,29-11

29,39-H

3.3400E-06

2.0000E+02

3.3400E-08

2.00008+02

FORM \$41A (10-95)

288/1

293/1

0.21

7.35

0.21

7.35

158.49

0.17

201.85

0.22

<1.0000E-04

<1.000E-02

<1.0000E-04

<1.000E-02

FORM 541A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc. 2. MANIFEST NUMBER 4032-01-003

3. PAGE 23 OF 24 PAGE(S)

				CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	IATION)						3. PAGE 23 OF 2	A PAGE(S)	
	DISPOSAL CON	I AINER DESC	RIPTION				-	PHYSICAL DESCR	WASTE DESCRIPTION	N FOR EACH WAS	ECDIDITION	ONTAINER	PADIOLOGIC	AL DESCRIPTION		18.WAS
5. CONTAINER DENTIFICATION NUMBER / GENERATOR ID NUMBER(\$)	CONTAINER DESCRIPTION (See Note 1 & Note 1 A)	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL MSV/ftv	_MBo/1 dpm/1	FACE SINATION DO CTT2 DO CTT2 BETA-	VASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE	13. SOLIDIFICATION OR STABILIZATION		WEIGHT % CHELATING AGENT	INDIVIDUAL R CONTAINER I	ADIONUCLIDI	ES AND ACTIVITY (MS DISTAINER TOTAL ACT CLIDE PERCENT		CATI AS-CI Stat AU-CI Uns B-Cir C-Ci
ID NUMBER(S)	11009 124)	(113)	(kg) (ton)	mrem/hr	ALPHA	GAMMA		(113)		i	IF>0.1%	RADIONUCLIDES	pCi/gm	MBq	mCl	C-Cl
												Total .		4.6953E-01	1.2690E-02	
294/1	1						29,39-H		NA NA		<u> </u>	0.11	2 00000E;	04 6 60705 03	1.8100E-03	3 A8
		0.21	201.85	<1.0000E-04	NP	3.3400E-06	20,3541	0.20	NA .	Nonemp	ИР	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 6.6970E-02 01 6.6970E-02 01 3.3659E-01	1.8100E-03 9.0700E-03	AS
		7.35	0.22	<1.000E-02	NP	2.0000E+02		7.36			<u> </u>	Subtotal		4.6953E-01	1.2690E-02	
	;											Total		4.6953E-01	1.2690E-02	
			<u> </u>													
295/1	4	0.21	65,77	<1.0000E-04	· NP	3.3400E-06	39-11	0.20	AM	NONE/NP	MP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 1.6798E-02 01 1.6798E-02 01 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
	·	7.35	0.07	<1.000E-02	КР	2.0000E+02		7.35				Subtotal		1.1759E-01	3.1780E-03	-I
												Total		1.1759E-01	3.1780E-03	4
		·		·				}								
297/1	4	0.21	65,77	<1.0000B-04	NP	3.3400E-08	39-H	0,20	NA	NONEINP	NP.	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 1.6798E-02 01 1.6798E-02 01 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
· · · · · · · · · · · · · · · · · · ·		7.35	8.07	<1,000E-02	NP	2.0000E+02		7.35				Subtotal		1.1759E-01	3.1780E-03	3
												Total		1.1759E-01	3.1780E-03	
				<u> </u>		<u> </u>									•	İ
303/1	4	0.21	201.85	<8.0000E-05	KP	3,3400E-08	29,39-4	0.20	HA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 6.6970E-02 01 6.6970E-02 01 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
7-7		7,38	. 0.22	<0.000E-03	• нр	2.0000E+02		7,35				Subtotal		4.6953E-01	1.2690E-02	-I
												Total		4.6953E-01	1.2690E-02	1
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FORM 541A (10-96)

FORM 541A

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FORM 541A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-003

- 3. PAGE 24 OF 24 PAGE(S)

			*	CONTAINE	R AND WAS	TE DESCR	IPTION (CONTINU	IATION)				<u>-</u>	3.	PAGE 24 OF	24 PAGE(S)	
	DISPOSAL CO	TAINER DESC	RIPTION					PHYSICAL DESCR	WASTE DESCRIPTION	ON FOR EACH WAS	E TYPE IN C	ONTAINER	5. RADIOLOGICA	DESCRIPTION		18.WASTE
5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3) (ti3)	8. WASTE AND CONTAINER WEIGHT	9, SURFACE RADIATION LEVEL	_MBo/I	AINATION IOD cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE	13. SOLIDIFICATION	1	WEIGHT % CHELATING AGENT	INDIVIDUAL	RADIONUCLIDES	AND ACTIVITY (ME TAINER TOTAL ACT IDE PERCENT	Iq) AND IIVITY	18.WASTE CLASSIFI- CATION AS-Class / Stable AU-Class / Unstable 8-Class E C-Class C
. ID NUMBER(S)	Note 1A)	(823)	(kg) (190)	mSv/hr mxem/hr	ALPHA	BETA- GAMMA		(FT3)	<u> </u>		IF>0.1%	RADIONUCLIDES	pCi/qm	МВа		
Shipment Totals		21,42	19638.14								•			4,5432E+01	1.2279E+00	
		749.70	21.39					•								
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FORM 541A (10-96)

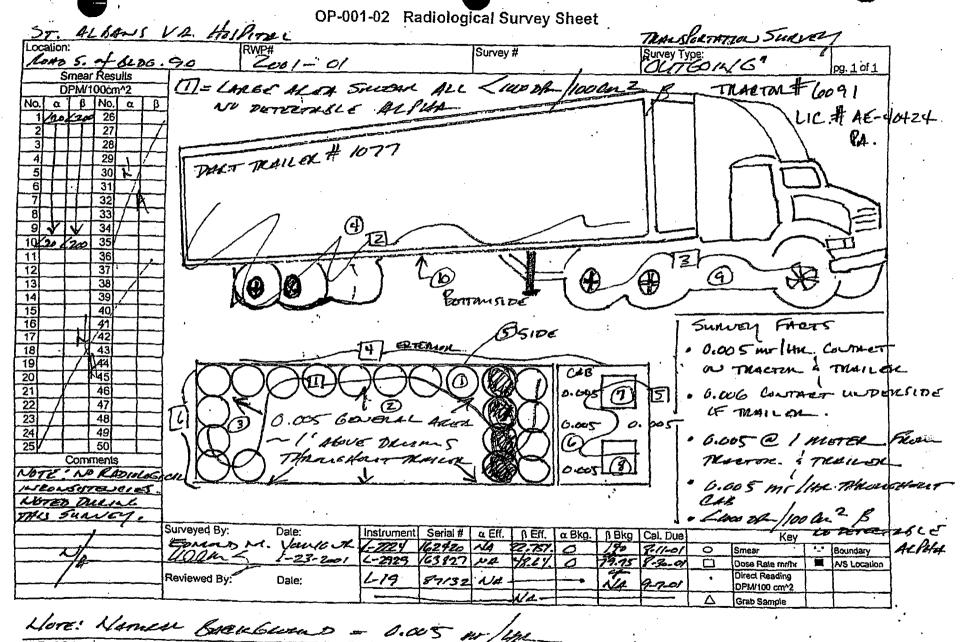
FORM 540 UNIFORM LOW-LE	VEL RADIOACTIVI	irocare of Utah, Inc. E	5. SHIPPE U.S. Army Co CENAE-EN-H 10 South Hov		ACILITY			T	40	NT LO, MANBER 132-01-001 COLLECTOR	FO	RM 540 AND 540A RM 541 AND 541A RM 542 AND 542A		F 7 PAGE(S) 24 PAGE(S) None PAGE(S)	8. MANIFEST NUI (Use this number pages) 4032-01	er on all continuation
WASTE	MANIFEST		Baltimore, M	D 21201-1715				_ -		PROCESSOR		DITIONAL INFORM		None PAGE(S)		
	ING PAPER		USER PERMI	THUMBER		8HIPMEI 4032-01-	NT NUMBI	ER		GENERATOR TYPE			and Facility Address		CONTACT Shipping and Recal	ving
1. EMERGENCY TELEPHONE NUMBER (Inclu 1-800-424-8878	de Area Code)		CONTACT							HONE NUMBER	Clive	ocare of Utalı, kıc. Eksposal Sile	•		TELEPHONE NUMB	ER (Include Area Code)
ORGANIZATION	 	· · · · · · · · · · · · · · · · · · ·	Mr. Hans I	ioneriah				(include 410-5	Area Code) 962-9184	Intersi Clive,	tate 80, Exit 49 UT 84029		·	(435)884-0155	
, Franklin Environmental Services, Inc.		·		R - Name and Ad	kress				PA LO	. NUMBER	SIGNA	TURE - Authorito	ad consignee acknowle	dging waste receipt	DATE	
2. IS THIS AN "EXCLUSIVE USE" SHIPMENT?	 TOTAL NUMBER OF PACKAGES IDENTIFIED 		Dart Trucking 61 Railroad S					Ŀ		9885825					<u> </u>	
X NO	ON THIS MANIFEST	103	Canfield, OH	44406				1	1/125/1 1/25/1	NG DATE 01	This is to	a and it should be be		CERTIFICATION	averthed exchanged made	ked and laheled and are
OOES EPA REGULATED WASTE REQUIRING A YES	epa manifest number		CONTACT Bin S	loddard				1	FELEPI Include 508-5	HONE NUMBER Area Code) 579-3471	certifies disposal	condition for tran that the materials as described in a	sportation according to are classified, packages cordance with the requ	the applicable regulation i, marked, and labeled irements of 10 CFR Pa	ns of the Department of I and are in proper condition to 20 and 61, or equivale	ked, and labeled and are framsportation. This also on for transportation and nt state regulations.
	ST ACCOMPANY X NO INFINENCE OF TRANSPORTATION DESCRIPTION S. DEPARTMENT OF TRANSPORTATION DESCRIPTION frigg proper this of or game, hazard class, UN ID number. DOT				ier scknowledgi	ing waste n	ecsipi	1	DATE		- ALTH	ORIZED SIGNAT	RE	TITLE		DATE
# 149', bioxiga waginasi uminosi	_		ł			*					ON,	STHAT OF	USHE	PASSET	Evernite	245m01
 U.S. DEPARTMENT OF TRANSPORTATIO (Including proper shipping name, hazard class and any additional information 	N DESCRIPTION UNID number	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	PHY: CHEM	14. SICAL AND IICAL FORM				IND RADIO	15. INVIDUAL DNUCLIDES		TOTAL P	16. ACKAGE ACTIVITY mCi	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted packar material, 7, UN2910	ge-limited quantity of	NA	NA	Solid /NA			C-14	H-3		Sr-90		2.3510E-01	6.3540E-03	NA NA	245, LBS; 7.35 FT3	009
Radioactive material, excepted packa material, 7, UN2910	ge-limited quantity of	NA	NA	Solid /NA			C-14	H-3		Sr-90		2.3510E-01	8.3540E-03	NA	245. LBS; 7.35 FT3	010
Radioactive material, excepted packa material, 7, UN2910	ge-Ilmited quantity of	NA ·	NA	Solid /NA			C-14	H-3		Sr-90		2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	013
Radioactive material, excepted packa material, 7, UN2910	ge-limited quantity of	NA	NA	Solid /NA			C-14	H-3		Sr-90	7	2.3510E-01	5.3540E-03	NA	245. LBS; 7.35 FT3	017
Radioactive material, excepted packa material, 7, UN2910	ge-limited quantity of	NA .	NA	Solid /NA			C-14	H-3		Sr-90		5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 F13	019
Radioactive material, excepted packa material, 7, UN2910		NA	NA	Solid /NA			C-14	H-3		Sr-90		2.3510E-01	8.3540E-03	NA	245. LBS; 7.35 FT3	021
Radioactive material, excepted packa material, 7, UN2910	ge-limited quantity of	NA	NA .	Solid /NA			C-14	H-3		Sr-90		.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	023
Radioactive material, excepted packa material, 7, UN2910	ge-limited quantity of	NA	NA	Solid /NA			C-14	H-3		Sr-90	2	.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	025
FOR CONSIGNEE USE ONLY		Record Waste Descr	iption Inadeo	quate	20. TERM:	S AND CO HAZARO hazardo	NOTION OUS MAT	ERIALS:	Gene	rator represents & wa	art share	t Waste Material	is (or) / is n	ol a hazardous waste a	s defined in 40 CFR 281.	Where the material is a liction notice and/or
·	Contamine				l	certificati	ion as requ	ired by	O CFR	268.1.	- 44/	e este entribierae (THE PERSON NAMED INCOME.		print and disposed (440	
•	Unexpects				B.	TITLE U	Jpon accep	ptance si	the dis	sposal site by Environ spon transfer from Ge	=are of Uta	th, Inc., and all app	ropriate regulatory suff	rorities, title to the Was	te Material which confort	ns to Generator's
	Labels,			•	c.	•				•				 El Badioactais was	STE MANIFEST) are true	and committee :
·		Container Integrity In	adequate		"	eli tespec	cts and in	accorder	ice with	ı ari abbildaple Boseu Manetin and Asturi	runertei la	wa serman in ind wa rulos, regulatio	ons and Envirocars of U	tah, Inc.'s facility licens	8. 8. m/WIFE31) als 208	OWN CONTROL IN
·	***************************************	Other			D.	INDEMNI	IFICATION	t Gener	rator eg	rees to indemnity En	virocare of	f Utah, Inc., its offi	cers, employees and ap	ente against all losses	and liability whatsoever it I-LEVEL RADIOACTIVE	such losses or
		No Violations Detect	ed on this Sh	ipment.]	MANIFES	ST.) or if th	uls shipm	ent fail:	s to mest the standar	cp blescij	ped ph the Debaut	nent of Transportation of	n suà doseumeurej vo er ere frum curej cos	ancy having jurisdiction o	ver such meller).

FORM 540 (10-96)

WASTE SHIPMENT RECORD

	1. Work site (Generator):		Own	er's Name	Ówn	er's
	Name US Army Corps of Engineers - Baltimo	ore Dist.		•	telepho	
100	Mailing Address CENAE-EN-HI. 10 South Howard		St. A	Iban's VAECC		
, i	City/State/Zip Baltimore, MD 21201-1715				1	
A. S. C.	2. Remover's name and address:			······································	Remo	ver's
	Franklin Environmental Services, Inc.				telepho	ne no.
	185 Industrial Road				(508) 384	-6151
	Wrentham, MA 02093	<u></u>				
	3. Waste Disposal Site (WDS) Name Envirocare of Utah, Clive Dispos	a+12 Fe	WDS	one no: (43	5) 884-0155	
	Mailing Address Interstate 80, Exit 49	as Sice		onal Information		
	City/State/Zip Clive, UT 84029		Additi	onal informatio	on:	
!	Physical Theoretic SO 5000 AC		7	Desfile No.	4 0 3 2	
ĸ	Site Location Interstate 80, EXIT 49	į		Profile No.	4 0 3 2	<u>-</u>
τo	Clive, UI_84029		┸——			
GENERATOR	4. Name and address of responsible agency					}
E						
1111						
٠	5. Description of materials	· · · · · · · · · · · · · · · · · · ·	6. C	ontainers	7. Total q	uentity
	or wording the first of the total of		No.	Туре	m³ (y	
	RQ, ASBESTOS, 9, NA2212, III		10	-r a-l	B CIA	.3
	RQ = 1 LB (ONE POUND)		3	55-gal	0.82	70
	8. Special handling instructions and additional info	rmotion (nee	Vidad b	OFUE	L	<u></u>
	Limited Grantity Radioactive Moster	milation (pro		y generator.)		}
	9. OPERATOR'S CERTIFICATION: I hereby declar		ontente	of this consid	nment are fu	illy and
	accurately described above by proper shipping n	ame and are	classifie	d. packed, mar	ked, and label	led, and
	are in all respects in proper condition for transpo	ort by highwa	ay accor	ding to applica	ble internatio	nal and
`	government regulations. NOTE: Generator must	retain a cop	y of this	form.		
	Printed/typed name & title	N S	ignature		Month Day	Year
	Robert Toss - REDREY MARINE	Jan 1		en_	01 23	01
·	10. Transporter 1 (Acknowledgment of receipt of ma	terials)	0			
	Printed/typed name & title	,	ignature		Month Day	Year
	CARI Chilson	100	12		01 24	01
	'	La-C	100000		•	
8.0	Dart Trucking Co. Tac. Address and telephone no.			ł		İ
Ä	61 Ruilroad Street					i
.HC	Can Field, OH 44406 5085793471					ļ
)d;		L				<u> </u>
N.S	11. Transporter 2 (Acknowledgment of receipt of ma	terials)				
TRANSPORTER	Printed/typed name & title	Si	gnature		Month Day	Year
Ε-						
	·		•	1		į
	Address and telephone no.			j		j
				1		
	,					
ш	12. Discrepancy Indication space		····	Rejected:		
SITE	· · · · · · · · · · · · · · · · · · ·		l	Yes	No 🗆	ł
	13. Waste disposal site owner or operator: Certification	n of receipt o	f asheet	0e	140 []	
`	materials covered by this manifest except as noted	in Item 12.	. 450681			-
Đ.						
DISPO	Printed/typed name & title	Si	gnature		Month Day	Year
-					<u>.</u>	

ORIGINAL RETURN TO GENERATOR



OP-001

CABRERA SERVICES, INC.

Page 15 of 15



FORM 840 UNIFORM LOW-LEVEL RADIO WASTE MANIFEST	DACTIV	virocare of Utah, inc. /E	U.S. Army Co CENAB-EN 1 10 South Ho			•		81	4032-01-001 COLLECTOR PROCESSOR	FO	ORM 540 AND 540A ORM 541 AND 541A ORM 542 AND 542A ODITIONAL INFORM		F 7 PAGE(S) 24 PAGE(S) Hone PAGE(S) None PAGE(S)	8. MANFEST NU (Use this number pages) 4032-01	er on eil continuation
SHIPPING PAPER		·	USER PERM NA	IT NUMBER		8HIPMEN 4032-01-0	T NUMBER	寸,	GENERATOR TYPE		ONSIGNEE - Name a	nd Facility Address		CONTACT Shipping and Recei	ving
ENERGENCY TELEPHONE NUMBER (Include Area Code) 1-809-428-8878 ORGANIZATION			CONTACT- Mr. Hans I	ioneriah	· L			a.	EEPHONE NUMBER Ictude Area Code) 418-862-9184	Clive	rocure of Utah, Inc. Bisposal Site state 80, Exit 49			,	ER (Include Area Codo)
Fizaldin Environmental Services, Inc.			6. CARRE	R - Name and Ad	kiress			*	410-862-9164 PA LD. NUMBER	ــــــــــــــــــــــــــــــــــــــ	, UT 84029 AATURE - Authorite	d consignee actinowder	doing waste receipt	(435)884-0165 DATE	
	S DENTIFIE	ED .	Dart Truckin 61 Refroad					a	HD100865829						
YES ON THIS I	ANDFEST	> 103	Camifeld, Oli	44405					EPPING DATE 1/23/01	This is	to certify that the he		CERTIFICATION or properly classified	tescribed padenced mar	ked, and labeled and a
4. DOES EPA REGULATED YES EPA MANGFEST WASTE REQUIRING A MANGFEST ACCOMPANY V NO	NUMBER		CONTACT BUIL	Stoddard	-			TI (U	LEPHONE NUMBER Intuite Area Code) 508-579-3471	in prop certific dispos	er condition for trans a that the malorials a as as described in ac	re classified, peckages ourdance with the requ portaince with the requ	the applicable regulation i, marked, and labeled frements of 10 CFR Pa	iescribed, packaged, mar ris of the Department of and are in proper condition to 20 and 61, or equivale	Fransportation, This at on for transportation an uni state regulations.
HANFEST ACCOMPANY X NO THIS SHIPMENT? If Yes, provide Menitest Number			SIGNATURE	- Aughorand com	-	ing waste re	ceint	Δ	STE	- 1	HOROED SIGNATURE	RE Cha	me		DATE
	DEPARTMENT OF TRANSPORTATION DESCRIPTION				1		····	10	11-24-01	ou.	BOHALF OF		Presister 1		245m01
 U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number; and any additional information 	ing proper shipping name, hazard class, UN ID number; POT sand any additional information RADIO				14. SICAL AND TCAL FORM			1	16. Individual Radioniiclides		TOTAL PA	16. ACKAGE ACTIVITY INC)	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited qui material, 7, UN2910		NA (NA	Solid /NA		C	3-14	H-3	Sr-90	·	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	009
Radioactive material, excepted package-limited qui material, 7, UN2910		NA NA	NA	Solid /NA		C	:-14	H-3	Sr-90		2.3510E-01	В.3540E-03	NA ·	245. LBS; 7.35 FT3	010
Radioactive material, excepted package-limited qui material, 7, UN2910		NA	NA	Solid /NA			:-14	H-3	Sr-90	:	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	013
Radioactive material, excepted package-limited qui material, 7, UN2010		NA	VA .	Solid /NA				H-3	Sr-90		2.3510E-01	5.3540E-03	NA	245. LBS; 7,35 FT3	017
Radioactive material, excepted package-limited quanterial, 7, UN2910		NA	NA	Solid /NA				H-3	Sr-90		5.8508E-01	1.5840E-02	NA	645. LBS; 7,35 FT3	019
Radioactive material, excepted package-limited qui material, 7, UN2910		NA .	NA	Solid /NA				H-3	5r-80		2.3510E-01	6.3540E-03	NA	245. LBS; 7,35 FT3	021
Radioactive diaterial, excepted package-limited qui material, 7, UN2910		NA	NA	Solid MA		•		H-3	Sr-90		2.3510E-01	6.3540E-03	NA .	245. LBS; 7,35 FT3	023
Radioactive material, excepted package-limited qui material, 7, UN2910	antity of	NA	NA	Solid /NA		C	-14	H-3	Sr-90		2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	025
FOR CONSIGNEE USE ONLY		Record Waste Descr	iption Inade	ruate	20. TERMS	S AND CON HAZARDO	US MATER	ZÁLS: (Saneralor represente & w	errants th	ed Wasto Materio)	is (or)/_is no	d a hazardous waste p	defined in 40 CFR 261.	Where the material is
•		Contamination or Les	•	•	ł	hezerdous	weste, this	shipma	nt is also eccompanied by CFR 258.1.	a separa	ne and completed ha	zardous wasta manifes	t, along with the appro	priate land-disposal restri	iction notice and/or
•	Contam Unexpe					me up	on accepta	nce at t	he disposal site by Environeroupon transfer from Ge	zane of U	let, inc., and all appr	opriate regulatory auth	orilias, ilija to the Was	le Material which conform	s to Generator's
		Labels, Markingis, etc	: Inadequate	• • •	ĺ	· ·			-				-I RADIOACTRIEWS	STE WANIFEST) are true	and owned in
		Container Integrity in	adequat o		ł	all respect	s and in acc	condence	s with ed sppticable gover	nmental l	anus, nules, regulation	is and Envirocare of Ui	tah, Inc.'s facility (Icans	s.	
		Other			D.	INDEMNIF	ICATION: Lifts from th	General e failure	or egrees to indemnify En of the Weste Material to	virocare e confolm i	of Utah, Inc., Its office o all material respect	ors, euroloyees and age to the data supplied o	ants against all losses on the (UNSFORM LOY)	and Rability whatsoover if LEVEL RADIOACTIVE I	such losses or WASTE

FORM 540 (10-96)

FORM 540A

UNIFORM LOW-LEVEL RADIOACTIVE
WASTE MANIFEST
SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc. 8. MANIFEST NUMBER (Use this number on all continuation pages) 4032-01-001

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			THO PAPER (COR)		•					PAGE Z OI	PAGES
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID rumber, and any additional information	12. DOT LABEL. "RADIOACTIVE"	13, TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM			15. DIVIDUAL ONUCLIDES	TOTAL PAG MBq	18. KAGE ACTIVITY MCI	17. LSA/SCO CLASS	18, TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	B.3540E-03	NA	245. LBS; 7.35 FT3	027
Radioactive material, excepted package-limited quantity of material, 7, UN2910	'NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	028
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245, LBS; 7.35 FT3	029
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	035
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245, LBS; 7.35 FT3	036
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	039
Radioactive material, excepted package-limited quantity of material, 7, UN2910	ŅA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	040
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	041
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	042
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7,35 FT3	046
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	047
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	048
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid (NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	049
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	Ç-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	050
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	051
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	8.3540E-03	NA NA	245. LBS; 7.35 FT3	057
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	2.3610E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	060
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	2.3510E-01	8.3540E-03	NA	245. LBS; 7.35 FT3	089

FORM 540A								Envi	rocare of Utah, Ir	(Use this numbers)	per on all continuation
			ORM LOW-LEVEL RA WASTE MANIFE PPING PAPER (CONT	ST					•		1-001 OF 7 PAGES
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper stripping name, histard class, UN ID number, and any additional information	12. DOT LABEL TADIOACTIVE	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		INE RADI	15. DIVIDUAL DNUCLIDES	TOTAL PAG	16. CKAGE ACTIVITY MCI	17. ESA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA :	646. LBS; 7.36 FT3	090
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA -	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	091
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	092
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	095
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA ·	NA	Solid /NA	C-14	Н-3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	096
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	114
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA .	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	115
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	120
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	.NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	121
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA /	345. LBS; 7.35 FT3	127
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	135
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	G-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	136
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	G-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	137
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	138
Radioactive material, excepted package-limited quantity of material, 7, UN2910	ÑA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	146
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	147
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	345. LBS; 7.35 FT3	148
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	149

FORM 540A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc.

MANIFEST NUMBER (Use this number on all confirmation pages) 4032-01-001

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11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including access shipping pame, based class, UN ID number.	12. DOT LABEL	- 13. TRANSPORT	14. PHYSICAL AND		mit	15.	TOTAL DAY	18. KAGE ACTIVITY	17. LSA/SCO	18. TOTAL WEIGHT OR VOLUME	19. IDENTIFICATIO NUMBER OF
(Including proper shipping name, hazard class, UN ID number, and any additional information	"RADIOACTIVE"	MDEX	CHEMICAL FORM		RADI	ONUCLIDES	MBq	,mCt	CLASS	(Use appropriate units)	PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	Н-3	Sr-90	3.5224E-01	9.6200E-03	NA	345. LBS; 7.35 FT3	160
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA ·	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA *	345. LBS; 7.35 FT3	164
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	165
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	166
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA ·	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345, LBS; 7.35 FT3	169
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA.	Solid /NA	. C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	·FT3	175
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA .	146. LBS; 7.35 FT3	180
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	186
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	187
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345, LBS; 7.35 FT3	188
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	190
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	191
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	193
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA ·	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	196
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	197
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	201
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	845. LBS; 7.35 FT3	202
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA .	645. LBS; 7.35 FT3	203

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UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

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U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information	12. DOT LABEL TRADIOACTIVE	13, TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		INE RADIO	15. NVIDUAL DHUCLEDES	TOTAL PAG MBq	IB. CKAGE ACTIVITY MCI	17. LSA/SCO CLASS	18, TOTAL WEIGHT OR VOLUME (Use appropriate units)	19, IDENTIFICATIO NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NÁ	NA ·	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	209
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	FT3	211
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid MA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	FT3	212
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA ·	FT3	214
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA .	FT3	218
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	220
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	222
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA .	645. LBS; 7.35 FT3	223
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	нэ	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	226
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NÁ	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	227
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	229
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	230
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA	645. LBS; 7.35 FT3	231
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA .	145. LBS; 7.35 FT3	234
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	7.0448E-01	1.9040E-02	NA .	645. LBS; 7.35 FT3	235
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	239
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	242
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	Н-3	Sr-90	4.6953E-01	1.2690E-02	ÑĀ	445. LBS; 7.35 FT3	245

FORM \$40A (10-98)

FORM 540A

FORM 540A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc.

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U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hexard class, UN ID number, and any additional information	12. DOT LABEL TRADIOACTIVE	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	1	IND RADIO	15. HVIDUAL DNUCLIDES	TOTAL PAC	18. EKAGE ACTIVITY mCl	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA :	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA NA	FT3	247
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA ·	Solid /NA ·	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	· NA·	145. LBS; 7.35 - FT3	254
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445, LBS; 7.35 FT3	259
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	545. LBS; 7.35 FT3	260
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	5.8608E-01	1.5840E-02	NA	FT3	261
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	FT3	262
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA .	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	263
Radioactive material, excepted package-limited quantity of naterial, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7,35 F13	265
tadioactive material, excepted package-limited quantity of naterial, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	267
tadioactive material, excepted package-limited quantity of naterial, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	269
Radioactive material, excepted package-limited quantity of naterial, 7, UN2910	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7,35 FT3	270
tadioactive material, excepted package-limited quantity of naterial, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	272
Radioactive material, excepted package-limited quantity of naterial, 7, UN2910	NA NA	NA	Solid /NA	C-14	Н3	Sr-90	2.3510E-01	6.3540E-03	NA	245. LBS; 7.35 FT3	273
tadioactive material, excepted package-limited quantity of naterial, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7,35 FT3	280
ladioactive material, excepted package-limited quantity of naterial, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NA	345. LBS; 7.35 FT3	285
Radioactive material, excepted package-limited quantity of naterial, 7, UN2910	ŅĀ	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7,35 FT3	299
tadioactive material, excepted package-limited quantity of insterial, 7, UN2910	NA .	NA	Solid /NA	C-14	H-3	Sr-90	3.5224E-01	9.5200E-03	NÃ	345. LBS; 7.35 FT3	300
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	H-3	Sr-90	4.6953E-01	1.2690E-02	NA	445. LBS; 7.35 FT3	301

FORM 540A (10-86)

Envirocare of Utah, Inc.

MANIFEST NUMBER
(Use this number on all continuation pages)
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UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

• -		SHII	PPING PAPER (CONT		ON)						PAGE 7 OF	7 PAGES
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper phopping name, hazard class, UN ID number, and any additional information	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT	14. PHYSICAL AND CHEMICAL FORM			15. INDIVIDI RADIONUI	UAL CLIDES	TOTAL PACE	18. (AGE ACTIVITY mCl	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA ·	Solid /NA	C-14	4 H.	3	Sr-90	4.6953E-01	1.2690E-02	NA ·	FT3	302
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA .	NA .	Solid /NA	C-14	4 H-	3 !	Sr-90	2.3510E-01	8.3540E-03	NA	F13	304
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	4 H-	3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	305
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	4 H-	3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 F73	306
Radioactive material, excepted package-limited quantity of material, 7, UN2910	NA	NA	Solid /NA	C-14	¥ H-	3	Sr-90	1.1759E-01	3.1780E-03	NA	145. LBS; 7.35 FT3	309
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FORM 540A (10-96)											J	

FORM 540A

1, MANIFEST TOTALS
SPECIAL NUCLEAR MATERIAL (grams) FORM 541 2. MANIFEST NUMBER Envirocare of Utah, Inc. NUMBER OF PACKAGES DISPOSAL 4032-01-001 NET WASTE NET WASTE TOTAL · · U-233 U-235 VOLUME **UNIFORM LOW-LEVEL RADIOACTIVE** 3. PAGE 1 OF 24 PAGE(S) 15467.76 21.63 kg **WASTE MANIFEST** NP 103 NP NP NP 4. SHIPPER NAME 757.05 ton 17.05 U.S. Army Corps Of Engineers CONTAINER AND WASTE DESCRIPTION ACTIVITY SOURCE ALL NUCLIDES TRITIUM C-14 I-129 Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste 4 0035F+01 5.7203E+00 \$,7203E+00 SHIPMENT ID NUMBER NP N₽ NA MBq (kgs) 4032-01-001 1.0820E+00 1.5480E-01 1.5460E-01 NA mCi (tons DISPOSAL CONTAINER DESCRIPTION WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER CLASSIFI-CATION AS-Class A 15. RADIOLOGICAL DESCRIPTION PHYSICAL DESCRIPTION 14. CHEMICAL DESCRIPTION 8. WASTE 10. SUBFACE 2. APPROXIMATE 13. INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MEQ) AND AND SUBFACE CONTAMINATION WASTE WASTE SOI INVEICATION WEIGHT CONTAINER Stable AU-Class A CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY
AND RADIONUCLIDE PERCENT IDENTIFICATION CONTAINER VOLUME CONTAINER RADIATION MBc/100 cm2 DESCRIPTOR VOLUME(S) IN OR STABILIZATION CHEMICAL FORM Unstable B-Class B C-Class C (See Note 2 & Note 2A) WEIGHT CONTAINER CHELATING AGENTICHELATING GENERATOR ID NUMBER(S) (See Note 1 & Note 1A) (m3) (FT3) (See Note 3) AGENT IF>0.1% FETA. mSvihr ALPHA RADIONUCLIDES menth GAMMA NONE/NP AS 009/1 39.29-H NA 3.3559E-02 1.6798E-01 111.13 <8.0000E-06 3.3400E-06 0.20 H-3 Sr-90 0.21 NP Subtotal 2.3510E-01 6.3540E-03 7.35 0.12 <8,000E-03 2,0000E+02 7.35 Total 2.3510E-01 6.3540E-03 1.00000E+01 1.00000E+01 5.00000E+01 3.3559E-02 3.3559E-02 1.6798E-01 9.0700E-04 9.0700E-04 4.5400E-03 C-14 H-3 Sr-90 NONEMP AR 39,29-H NA 010/1 0.21 <8.0000E-08 3.3400€-06 0.20 NP 2.3510E-01 6.3540E-03 Subtotal 7.35 0.12 <8.000E-03 2.000002+02 7.35 2.3510E-01 6.3540E-03 Total 9.0700E-04 9.0700E-04 4.5400E-03 1.00000E+01 1.00000E+01 5.00000E+01 3.3559E-02 3.3559E-02 1.6798E-01 39,29-41 MONPANE 013/1 MA H-3 Sr-90 0.21 111.13 <8.0000E-05 NP 3.3400E-08 0.20 Subtotal 2.3510E-01 6.3540E-03 7.35 0.12 <8.000€-03 2.0000E+02 7,35 Total 2.3510E-01 6.3540E-03 Note 1A: Bulk Packaging Description Codes NOTE 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.) Note 2A: Specific Wests Description Note 3: Solidification and Stabilization Media Codes. (Choose up to NOTE 1: Container Description Codes. For containers hoose all applicable codes.) three which predominate by volume.) For media meeting disposal site waste requiring disposal in approved structural over-packs the numerical code must be followed by "-OP." thoose one code as may be applicable.) structural stability requirements, the numerical code must be followed by "-5" and the media rendor and brand name must also be identified 20. Charcost 29. Demostion Rubble 38. Evaporator Bottoms/Sludges/ 30. Cation Ion-exchange Media A Gondola 21. Indicarator Ash Concentrates

31. Anion Ion-exchange Media 32. Mixed Bed Ion-exchange Media

33. Contaminated Equipment 34. Organic Liquid (except oil)

35. Glassware or Labware

36. Sesied Source/Device 37. Paint or Plating 39 Compactible Trash

41. Animal Carcass
42. Biological Material (except

43. Activated Material 59. Other, Describe in item 11,

or additional page

animal carcass)

Dewatered

Combustible

Non-combustible

Air Filtration Fixors

Solid

In item 13, Code 100-NONE REQUIRED

94. Vinyl Ester Styrens

In item 13 or

99. Other. Describe

100. None Required.

Solidification

90. Cement

91. Concrete

(encapsulation) 92. Bitumen

93. Vinyl Chlorida

, Wooden Box or Crate

Plastic Orum or Pail

Metal Drum or Poll

Metal Tank or Liner

Metal Box

9. Demineraliza 10. Gas Cylinder

Concrete Tank or Liner 19, Other, Describe in Item 8,

11. Bulk, Unpackaged Waste 12. Unpackaged Components 13. High Integrity Container A intermeda

C End-dump

D Roll-off

E Sasvar

22. Soil 23. Ges

24. Qi

25. Arusous Llouid

27. Mechanical Filter

78. EPA or State

26. Filter Media

FORM 541A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

3. PAGE 2 OF 24 PAGE(S)

			•	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINU	IATION	•-				3.	PAGE 2 OF 24	PAGE(S)	
	DISPOSAL CO	TAINER DESC	RIPTION		1			PHYSICAL DESCRI	WASTE DESCRIPTION	N FOR EACH WAST		ONTAINER	5. RADIOLOGICAL	DESCRIPTION		16.WASTE CLASSIFI-
5. CONTAINER IDENTIFICATION . NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE - AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	10. SURI CONTAN MBa/1 dpm/10	ENATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12 APPROXIMATE WASTE			WEIGHT % CHELATING AGENT	INDIVIDUAL	RADIONUCLIDES A TOTAL: OR CONTA AND RADIONUCLI	ND ACTIVITY (MB	Q) AND IVITY	CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
. ID NUMBER(9)	Note 1A)	(m3) 	(kg) (ton)	mSv/hr mrem/hr	ALPHA	BETA- GAMMA		(FT3)	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		IF>0.1%	RADIONUCLIDES	pCl/gm	MBq	mCi	1
977/I		0.21	111.13	<9.0000E-05	ЮР	3.3400E-08	39,29-H	0.20	NA	HONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3659E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
	•	7.35	0.12	<8.000E-03	. NP	2.0000E+02	, .	7.35		1		Subtotal	<u> </u>	2.3510E-01	6.3540E-03	
												Total		2.3510E-01	6.3540E-03	
				<u>. </u>			l <u></u>									
018/1	4	0.21	247.21	<8.0000E-05	NP	3.3400E-08	29,39,L-HL	0.20	NA	NONE/NP	NР	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
		7.36	0.27	<8.000E-03	· NP	2.0000E+02		7.35				Subtotal		5.8608E-01	1.5840E-02	<u> </u>
												Total		5.8608E-01	1.5840E-02	
021/1		0.21	111.13	<8.0000E-05	. NP	3.3400E-06	39,29-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.38	0.12	<8.000€-03	NP	2.00002+02		7.35				Subtotal		2.3510E-01	6.3540E-03	<u> </u>
		<u>.</u>			<u> </u>					3		Total		2.3510E-01	6.3540E-03	
!					İ											
923H	4	0.21	111.13	<8.0000E-05	NP	3.3400E-08	39,29-11	0.20	NA	NONEMP	NP .	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
_		7.35	0.12	<8.000E-03	. NP	2.0000E+02		7.35				Subtotal		2.3510E-01	6.3540E-03	<u>i</u>
												Total		2.3510E-01	6.3540E-03	
													}			
025/1	4 "	0.21	111.13	<8.0000E-05	ИР	3.3400E-06	39,29-14	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	3.3559E-02 3.3559E-02 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		2.3610E-01	6.3540E-03	-1

FORM 541A (10-96)

4032-01-001 **WASTE MANIFEST** 3. PAGE 3 OF 24 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) DISPOSAL CONTAINER DESCRIPTION WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINS IG.WASTE CLASSIFI-CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C 15. RADIOLOGICAL DESCRIPTION 9. SURFACE RADIATION 12 APPROXIMATE 13, WASTE S VOLUME(S) IN OR e. WASTE SURFACE SOLDIFICATION CHEMICAL FORMY %
OR STABILIZATION CHEMICAL FORMY %
CHEMICAL FORMY %
AGENT INDMIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT CONTAINER AND CONTAINER WEIGHT WASTE IDENTIFICATION NUMBER / CONTAINER VOLUME MBo/100 cm2 dom/100 cm2 DESCRIPTOR (See Note 2 CONTAINER GENERATOR ID NUMBER(S) (See Note 1 & Note 1A) (ft3) AGENT & Note 2A) mSv/hr ALPHA mCl GAMMA Total 2.3510E-01 6.3540E-03 1.00000E+01 1.00000E+01 5.00000E+01 027/1 C-14 H-3 Sr-80 39,29-H NONE/NP 0.21 111.13 <8.0000E-05 NP 3.34000-08 0,20 2.3510E-01 6.3540E-03 7.35 0.12 <8.000E-03 NP 2.0000E+02 Subtotal 7,35 6.3540E-03 2.3510E-01 Total 1.00000E+01 1.00000E+01 5.00000E+01 C-14 H-3 Sr-90 9.0700E-04 39,29-H NONEMP 0.21 <8.0000E-05 3.3400E-08 0.20 7.35 0.12 <8.000E-03 2.000000+02 7,35 Subtotal 2.3510E-01 6.3540E-03 6.3540E-03 Total 2.3510E-01 9.0700E-04 9.0700E-04 4.5400E-03 3.3559E-02 3.3559E-02 1.6798E-01 029/1 39,29-41 NONEMP C-14 H-3 Sr-90 0.21 <8.0000E-05 3.3400E-08 0.20

7.35

0.20

7.35

UNIFORM LOW-LEVEL RADIOACTIVE

2,00002+02

3.3400E-06

2.0000E+02

39,29-H

7.35

0.21

7.35

0.12

<8.000E-03

<5,0000E-05

<8.000E-03

Envirocare of Utah, Inc.

Subtotal

Total

H-3 Sr-90

Total

Subtotal

NONE/NP

2. MANIFEST NUMBER

2.3510E-01

2.3510E-01

3.3559E-02 3.3559E-02 1.6798E-01

2.3510E-01

2.3510E-01

6.3540E-03

6.3540E-03

9.0700E-04 9.0700E-04 4.6400E-03

6.3540E-03

6.3540E-03

FORM 541A

FORM 541A (10-96)

UNIFORM LOW-LEVEL RADIOACTIVE

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

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			Č			E MANII							3. PAGE 4 OF 24	4 PAGE(S)	
· · · · · · · · · · · · · · · · · · ·	NICONSTITUTE	VIAINER DESCI	ola film	CONTAINE	R AND WAS	TE DESCR	PHON (CONTINU	ATION)	WASTE DESCRIPTION	W EUR ENCH WAST	E TYPE /N C	OMYAINED			HEWASTE
5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR ID NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 1 & Note 1 A)	7. VOLUME (m3) (m3)	8. WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL mSyltr	10. SURF CONTAM MB0/11 dpm/10	INATION 00 on 2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	PTION 13. SOLIDIFICATION OR STABILIZATION	14. CHEMICAL DE	WEIGHT	15. RADIO RIDNIXIAL RADIOI CONTAINER TOTAL AND R	OLOGICAL DESCRIPTION RUCLIDES AND ACTIVITY (M8 OR CONTAINER TOTAL ACT ADIONUCLIDE PERCENT	BANA (PE	CLASSIFI- CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
036/1	4	<u> </u>	(ion)	mrem/hr	ALPHA	GAMMA	39,29-11	 	NA NA	NONE/NP		C-14 (1.00)	Cilom MBq 000E+01 3.3559E-02	9.0700E-04	AS
030/1	•	0.21	111.13	<8.0000E-05	NP	3.3400E-06	35,2541	0.20	· ·		NP	H-3 Sr-90	000E+01 3.3559E-02 000E+01 1.6798E-01		
		7.35	0.12	<8.000E-03	NP	Z0000E+02	<u> </u>	7.35				Subtotal	2.3510E-01	6.3540E-03	<u> </u>
				·					·			Total	2.3510E-01	6.3540E-03	
03971	4	0.21	247.21	<8.0000Z-05	МP	3.3400E-08	29,39-H	0,20	NA.	NONE/NP	· NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 8.3990E-02 000E+01 8.3990E-02 000E+01 4.1810E-01	2.2700E-03 1.1300E-02	
		7.36	0.27	<8.600E-03	NP	2.0000E+02		7.35				Subtotal	5.8608E-01	1.5840E-02	1
												Total	5.8608E-01	1.5840E-02	
		1		ł	ŀ		1	l	L					٠.	
040/1	4	0.21	111.13	<8.0000E-05	NP	3.34008-09	39,29-H	0.20	NA .	NOKEMP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 3.3559E-02 000E+01 3.3559E-02 000E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	NP.	2.0000E+02		7.35				Subtotal	2.3510E-01	6.3540E-03	1
		<u> </u>		<u> </u>	 	<u> </u>	}					Total ·	2.3510E-01		
041/1	4	0.21	85.77	<8.0000E-05	NP	1.3400E-08	39-H	0.20	NA	NONEINP		C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 1.6798E-02 000E+01 1.6798E-02 000E+01 8.3990E-02	4.5400E-04	AS
		7.35	0.07	<5.000 E-03	ND	2,0000E+02		7.36]		NP	Subtotal	1.1759E-01		-1
										·		Total	1.1759E-01	3.1780E-03	1
- A-DM							39,29-H		NA NA	NONEMP	<u> </u>	C-14 1.00	000E+01 3.3559E-02	9.0700E-04	4 AS
042/1	[*	0.21	·- 111.13	<8.0000E-05	NP	3.3405E-08	11-12-11	0.20	, na	NONEMP	NP	H-3 Sr-90 5.00	000E+01 3.3559E-02 000E+01 1.6798E-01	4.5400E-03	3
	1	7.35	0.12	<8.000E-03	NP.	2,0000E+02	I	7,35	1	1	1	Subtotal	2.3510E-01	6.3540E-03	41

FORM 541A (10-96)

- FORM 541A

2. MANIFEST NUMBER Envirocare of Utah, Inc. FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE 4032-01-001 **WASTE MANIFEST** 3. PAGE 5 OF 24 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION). DISPOSAL CONTAINER DESCRIPTION CLASSIFI-CATION AS-Class A Stable AU-Class A 14. CHEMICAL DESCRIPTION TATISTICAL DESIGNATION

12. APPROXIMATE 13.

WASTE SOLIDIFICATION CHEMICAL FORM %

CONTAINER MEDIA CHEATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AGENT CHELATING AG CONTAMENATION
MBo/100 cm2
dpm/100 cm2 INDMIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT SURFACE RADIATION LEVEL WASTE CONTAINER IDENTIFICATION AND CONTAINER CONTAINER VOLUME DESCRIPTOR Unstable 8-Cless 8 C-Class C OESCRIPTION (See Note 1 & Note 1A) (See Note 2 & Note 2A) . NUMBER! GENERATOR ID NUMBER(S) BETA-GAMMA mSvirir. ALPHA RADIONUCLIDES 2.3510E-01 6.3540E-03 Total 4.5400E-04 4.5400E-04 2.2700E-03 1.00000E+01 1.00000E+01 5.00000E+01 39-H NONE/NP 046/1 NA H-3 Sr-90 65.77 <8.0000E-05 1.3400E-08 0.21 0.20 3.1780E-03 1.1759E-01 Subtotal 7.35 <8.000E-03 2.0000E+02 7.35 1.1759E-01 3,1780E-03 Total 1.6798E-02 1.6798E-02 8.3990E-02 C-14 H-3 Sr-90 HONEMP 047/1 3,3490E-08 0.21 65.77 ≪8.0000E-05 0.20 NP 1.1759E-01 3.1780E-03 Subtotal 2.0000E+02 7.35 <8.000E-03 7.35 1.17595-01 Total 4.5400E-04 AS 4.5400E-04 2.2700E-03 1.6798E-02 1.6798E-02 8.3990E-02 1.00000E+01 1.00000E+01 5.00000E+01 C-14 H-3 Sr-90 29-H NONEMP 048/1 0.21 65.77 <8.0000E-05 3,3400E-06 0.20 NP 3.1780E-03 1.1759E-01 Subtotal 7.35 <8.000€-03 2.0000E402 7.35 1.1759E-01 3.1780E-03 Total 1.00000E+01 1.00000E+01 5.00000E+01 1.6798E-02 4.5400E-04 1.6798E-02 4.5400E-04 8.3990E-02 2.2700E-03 C-14 H-3 Sr-90 39-H NONEMP 3.3400E-08 0.21 65,77 <8.0000E-05 0.20 1.1759E-01 3.1780E-03 Subtotal 0.07 <8.000E-03 2.0000E+02 7.35 1.1759E-01 3.1780E-03 Total

FORM 541A (10-98)



UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

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	DISPOSAL CO	NTAINER DESC	RIPTION	CONTAINE	R AND WAS	TE DESCRI	PTION (CONTINI	(MOITAL	WASTE DESCRIPTION	ON FOR FACH WAS	E TYPE IN A	OMYAINER		3,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	417.02(0)	18.WASTE
		1	I .					PHYSICAL DESCRI	PTION	14. CHEMICAL DE	SCRIPTION		5. RADIOLO	GIÇAL DESCRIPTION		CLASSIFI-
CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3) (f3)	8. WASTE AND CONTAINER WEIGHT	8. SURFACE RADIATION LEVEL	10. SURS CONTAN MBa/1 dpm/10	INATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	VASTE VOLUME(6) IN CONTAINER (m3) (FT3)	SOLIDIFICATION	CHEMICAL FORM/ CHELATING AGENT	AGENT	CONTAINED	R TOTAL; OR	LIDES AND ACTIVITY (MI CONTAINER TOTAL AC UNUCLIDE PERCENT	eq) and Tivity	GATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
ID NUMBER(S)	Note (A)	(ft3)	(kg) (kg)	m\$v/hr mrem/hr	ALPHA	BETA- GAMMA		(F13)			IF>0.1%	RADIONUCLIDES	pCi/gr	п МВа	mCi	i
050/1	4	0.21	65,77	<8.00008-05	NP	3.3400E-08	39-H	0.20	NA NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000 1.00000 5.00000	E+01 1.6798E-02 E+01 1.6798E-02 E+01 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
		7.35	0.07	<6.000E-03	NP.	2,00000:+02	'	7.35		<i>.</i>	Ì	Subtotal	ļ	1.1759E-01	3.1780E-03	
												Total		1.1759E-01	3.1780E-03	
			ļ													
051/1	1	0.21	158,49	<8.0000E-05	NP	3,3400E-06	\$9,29,L-HL	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000 1.00000 5.00000	E+01 5.0320E-02 E+01 5.0320E-02 E+01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
	<u> </u>	7.35	0.17	<8.000E-03	NP	2.0000E+02		7.25	·			Subtotal	l	3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	
] .							
057/1	4	0.21	111.13	<8.0000E-05	NР	3,3400E-08	39,29-11	0.20	NA	NONE/NP	MP	C-14 H-3 Sr-90	1.00000 1.00000 5.00000	E+01 3.3559E-02	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7.35	0.12	<8.000E-03	NР	2.0000E+02		7.35				Subtotal		2.3510E-01	6.3540E-03	.1
									<u> </u>			Total		2.3510E-01	6.3540E-03	
						,				·				1		1
beart	•	0.21	111.13	<8.0000E-05	NP ·	3.3400E-08	39,29-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000 1.00000 5.00000	E+01 3.3559E-02 E+01 3.3559E-02 E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	AS
		7,36	0,12	<8.000E-03	, NP	2.0000E+02		. 7.35				Subtotal		2.3510E-01	6.3540E-03	. i
				ļ								Total		2.3510E-01	6.3540E-03	
<u> </u>									· ·	}		•		, , , , , , , , , , , , , , , , , , ,		1
089/1	4	0.21	111.13	<8.0000E-06	NP	3.3400E-08	39,29-H	0.20	NA .	NONE/NP	NP	C-14 H-3 Sr-90	1.00000 1.00000 5.00000	E+01 3.3559E-02 E+01 3.3559E-02 E+01 1.6798E-01	9.0700E-04 9.0700E-04 4.5400E-03	
		7.35	0.12	<8.000E-03	NP	2.0000E+02		7.38	<u> </u>			Subtotal		2.3510E-01		.1
FORM 541A (10-98)																

FORM 541A (10-98)

FORM 541A

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc. 2. MANIFEST NUMBER 4032-01-001

						- 111/1/11		•		•			. 1:	3. PAGE 7 OF 24	PAGE(S)	
	DISPOSAL CO	NTAINER DESC	RIPTION	CONTAINE	AND WAS	TE DESCR	PTION (CONTINI		WASTE DESCRIPTION	N FOR EACH WAS	TE TYPE IN C	ONTAINER				18.WASTE CLASSIFF
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	WEIGHT	9. SURFACE RADIATION LEVEL		ONATION OO cm2	11. WASTE DESCRIPTOR (See Nots 2 & Nots 2A)	PHYSICAL DESCRI 12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (ITS)	SOLIDIFICATION OR STABBLIZATION	14. CHEMICAL DE CHEMICAL FORW CHELATING AGENT	WEIGHT	INOMIDUAL CONTAINE	RADIONUCLIDE	AL DESCRIPTION S AND ACTIVITY (MB NTAINER TOTAL ACT CLIDE PERCENT	Q) AND TVTY	CATION AS-Class A Stable AU-Class / Unstable B-Class B C-Class C
ID NUMBER(S)	Note 1A)	-(F3) -(F3)	(kg) (ton)	m\$vhr mremhr	ALPHA	BETA- GAMMA		(F13)			IF>0.1%	RADIONUCLIDES	pCVcm	M8q	mCl	C-Class C
			<u> </u>			•						Total		2.3510E-01	6.3540E-03	
590/1	4	0.21	292.87	<8.0000E-05	NP	3,3400E-08	29,39-11	9.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+1 1.00000E+1 5.00000E+1	01 1.0064E-01 01 1.0064E-01 01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.35	0.32	<8.000E-03	NP	2.0000E+02]	7.35	1		"	Subtotal		7.0448E-01	1.9040E-02	_
							·					Total		7.0448E-01	1.9040E-02	
091/1	\ <u></u>	ļ					29,39-H		NA.	NONEMP	ļ	C-14	1 000000	01 1.0084E-01	2.7200E-03	EA
041/1		0.21	292.57	<8.0000E-85	NP	3.3400E-06		0.20		NO NEW	NP	H-3 Sr-90	1.00000E+ 1.00000E+ 6.00000E+	01 1.0064E-01 01 1.0064E-01 01 5.0320E-01		
		7.35	0.32	<8.000E-03	NP	2.0000E+02		7.35			<u> </u>	Subtotal		7.0448E-01	1.9040E-02	L
•			ļ			<u> </u>						Total		7.0448E-01	1.9040E-02	
		ļ. —					29,39-H		NA NA	NONE/NP	<u> </u>	C-14	4 0000054	04 4 00045 04	2 7200E-03	AS
092/1	1	0.21	292.67	<0.0000E-05	KP	3.3400E-06	20,30-11	0.20	J ***	NONERP	NP	H-3 Sr-90	1.00000E+ 1.00000E+ 8.00000E+	01 1.0064E-01 01 1.0064E-01 01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	~~.
<u></u>		7,35	9.32	<8.000E-03	NP	2.0000E+02		7,25				Subtotal		7.0448E-01	1.9040E-02	
							1		_		1	Total		7.0448E-01	1.9040E-02	1
			·													1
095/1	4	0,21	292.57	<8.0000E-05	NP	3.3400E-06	29,39-11	0.20	NA .	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+ 1.00000E+ 5.00000E+	01 1.0064E-01 01 1.0064E-01 01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
<u>. </u>		7,35	0,32	<8.000E-03	NP	2.0000E+02		7.35		·		Subtotal		7.0448E-01	1.9040E-02	
												Total		7.0448E-01	1.9040E-02	
	1			1]]							

FORM 541A (10-96)

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

!,		-				E MAAIAII							- 1.	3. PAGE 8 OF 24	PAGE(S)	
	DISPOSAL CON	TAUNER DESIG	RIPTION	CONTAINE	RAND WAS	TE DESCRI	PTION (CONTINU	IATION)	WASTE DESCRIPTION	N FOR FACH WAST	E TYPE IN C	ONTAINER .				16,WASTE
						· · · · · · · · · · · · · · · · · · ·		PHYSICAL DESCRI	PTION	14. CHEMICAL DE		15	RADIOLOGI	CAL DESCRIPTION		CLASSIFI
CONTAINER DENTAINER DENTAICATION MUMBER / GENERATOR D NUMBERS)	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL mSymp.	10. SURF CONTAM MBart dpm/10	INATION 00.cm2	WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (FT3)	SOLIDIFICATION OR STABILIZATION	CHEMICAL FORM CHELATING AGENT	WEIGHT % CHELATING AGENT IP-0.1%	CONTAINER	TOTAL: OR CO	DES AND ACTIVITY (MB: ONTAINER TOTAL ACTI UCLIDE PERCENT	VITY	CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
	11000 174	(144)	(kg) (ton)	membe	ALPHA	GAMMA	<u> </u>	(, , , ,			11-0	RADIONUCLIDES	pCl/gm	MBq	mCI	
096/1		0.21			NP	1,3400E-06	39,29-11	0.20	NA.	NONE/NP	NP	H-3 Sr-90	1.00000E4 1.00000E4 5.00000E4		9.0700E-04 9.0700E-04 4.5400E-03 6.3540E-03	AS
1		7.35	0.12	<8.000E-03	NP	2.0000E+02	ł	. 7,35			·	Subtotal		2.3510E-01	6.354UE-03	
			•				·					Total		2,3510E-01	6.3540E-03	
114/1	4	0.21	158,49	<8,0000E-05	МP	3.3400E-08	39,29-H	0.20	NA .	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E- 1.00000E- 5.00000E-	+01 5.0320E-02 +01 5.0320E-02 +01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS .
<u></u>		7.25	0.17	<8.000E-03	NP	2.0000E+02		7,35				Subtotal		3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	
1		,						l	1		ļ			ļ		ı
115/1	4	0.21	156.49	<8.0000E-05	NР	3,3400E-08	39,29-11	1.20	NA -	NONEMP	NP	C-14 H-3 Sr-90	1.00000E 1.00000E 5.00000E	+01 5.0320E-02 +01 5.0320E-02 +01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	≪8.000€-03	NР	2,00008+02	· .	7.35				Subtotal		3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	
120/1	4	0.21	156,49	<8.0000E-05	NP	3.3400E-08	39,29-H	0.20	NA NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E 1.00000E 5.00000E	+01 5.0320E-02 +01 5.0320E-02 +01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.38				Subtotal '		3.5224E-01	9.5200E-03	
												Total ·		3.5224E-01	9.5200E-03	
																·
121/1	4	0.21	156.49	<8,0000E-08	NP	3,34002-08	39,29-H	0.20	NA NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E 1.00000E 5.00000E	+01 5.0320E-02 +01 5.0320E-02 +01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7,25	0.17	<8.000E-03	NP	2.6000E+02		7,35				Subtotal		3.5224E-01	9.5200E-03	<u></u>

FORM 541A (10-06)

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

				CONTABLE		TE DECCH	PTION (CONTINU	IATION					3.	PAGE 9 OF 24	4 PAGE(S)	
	DISPOSAL CON	TAINER DESC	RIPTION	LUNIAINE	K WHIT MAY	IE DESCR	PHONICONTINU		WASTE DESCRIPTION	ON FOR EACH WAS	TE TYPE IN C	ONTAINER				16.WASTE CLASSIFI-
a	6.	7.	B. WASTE	٠	10. SURF	ACE	11.	PHYSICAL DESCRI		14. CHEMICAL DE	SCRIPTION	15. R	ADIOLOGICAL	LOESCRIPTION		CLASSIFI- CATION AS-Class A
CONTAINER IDENTIFICATION NUMBER / GENERATOR ID NUMBER(S)	CONTAINER DESCRIPTION (See Note 1 & Note 1A)	VOLUME (m3)	AND CONTAINER WEIGHT	SURFACE RADIATION LEVEL	CONTAI MBo/1 dpm/10	ENATION DO cm2 DO cm2	WASTE DESCRIPTOR (See Note 2 & Note 2A)	WASTE	SOLIDIFICATION OR STABILIZATION	CHEMICAL FORM/ CHELATING AGENT	AGENT	CONTAINER TO	TAL: OR CONT	AND ACTIVITY (MB TAINER TOTAL ACT IDE PERCENT		Stable AU-Class A Unstable B-Class B C-Class C
ID HUMBER(S)	riote tro	(113)	(kgr) (fon)	m8v/hr mrom/hr	ALPHA	BETA- GAMMA		(F13)			IF>0.1%	RADIONUCLIDES	pCi/gm	MBq	mCI	C-Class C
							·	 				Total		3.5224E-01	9.5200E-03	А
_			1		1		' '		1	i			•	i i		ĺ
127/1	4	0.21	156.49	<8.0000E-05	NP	3.3400E-00	39,29-H	0.20	NA	NONEMP	NP	C-14 1. H-3 1. Sr-90 5.	.00000E+01 .00000E+01 .00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.006E-03	NP	2.0000E+02		7.35		<u> </u>		Subtotal		3.5224E-01	9.5200E-03	.i
								·				Total		3.5224E-01	9.5200E-03	
										i ·				·		
1391	4	0.21	156.49	<8.0000E-05	NP	3,3400E-08	39,29-H	0.20	NA .	HONE/NP	NP	C-14 1. H-3 1. Sr-90 5.	.00000E+01 .00000E+01 .00000E+01	5.0320E-02 5.0320E-02 2.6160E-01	1.3600E-03 1.3600E-03 6.8000E-03	i i
		7.35	0.17	<8.000E-03	ŅР	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
										`		Total		3.5224E-01	9.5200E-03	
					·					<u> </u>						ł
138/1	4	0.21	160,49	<8.0000E-05	NP	3.3400E-08	39,29-H	a.ża	NA NA	NONE/NP	NP	C-14 1. H-3 · 1. Sr-90 5.	.00000E+01 .00000E+01 .00000E+01	5.0320E-02 6.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
	·	7.35	0.17	<8.000E-03	KIP	2.0000E+02		7,36				Subtotal	_	3.5224E-01	9.8200E-03	
												Total		3.5224E-01	9.5200E-03	
1			,							.						1
137/1	4	0.21	, 156,49	<6.0000E-05	NP	3.3400B-06	39,29-H	0.20	NA	NONEMP	NP	C-14 1. H-3 1. Sr-90 5.	.00000E+01 .00000E+01 .00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
,		7.35	0.17	<8.000E-03	NP	2.0000E+02	·	7,3\$				Subtotal		3.5224E-01	9.5200E-03	
												Total		3.5224E-01	9.5200E-03	
									<u> </u>							

FORM 541A (10-08)

FORM 541A			ι	JNIFORI	VI LOW-	LEVEL	RADIOACTI	VE				Envirocare of U	tah, Inc. 2.	MANIFEST N		
	•	•			WAST	E MANI	FEST .					·	-	4032-01-0		
	·· .	NTAINER DESC	DIE PANA	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINE	UATION					3.	PAGE 10 OF	24 PAGE(S)	
	DISPOSALCO	I MANER DESC	RIPTION	Υ	l			PHYSICAL DESCR		IN FOR EACH WAS 14. CHEMICAL DE			. RADIOLOGICAL	DESCRIPTION		18.WASTE CLASSIFI
CONTAINER DENTIFICATION NUMBER / GENERATOR ID NUMBER(S)	G. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) (ft3)	8. WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL INSVITU	Mach	AINATION 100 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (ITS) (FT3)	SOUDIFICATION OR STABILIZATION	CHEMICAL FORM CHELATING AGENT	WEIGHT % CHELATING AGENT IF>0.1%	CONTAINER	RADIONUCLIDES TOTAL: OR CONT AND RADIONUCL	AINER TOTAL AC DE PERCENT	nvity	CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
138/1	•	0.21	156.49	- mrembr <8.0000E-05	NP	3.3400B-06	39,29-H	6.20	NA NA	NONEMP	NP	RADIONUCLIDES C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02	•	7,35		·	Ì	Subtotal		3.5224E-01	9.5200E-03	
												Total		3,5224E-01	9.5200E-03	
146/1	11	0,21	158,49	<8.0000E-05	NP	3.3400E-06	39,29-H	0.20	NA	NONE/NP	NР	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1,3600E-03 1,3600E-03 6,8000E-03	AS
		7.35	′ 0.17	<8.000E-03	, NP	2.0000000+02		7.36				Subtotal		3.5224E-01	9.5200E-03	
				ļ			;					Total		3.5224E-01	9.5200E-03	
147/1				ļ		<u> </u>										
14/21	1	0.21	158.49	<8.0000E-05	NP	3.3400E-06	39,29-H	0.20	NA .	NONE/NP ·	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	0.17	≪8.000E-03	NP	2.0000E+02		7.35				Subtotal		3.5224E-01	9.5200E-03	
İ	İ		<u> </u>									Total		3.5224E-01	9.5200E-03	
												·				
148/1	4	0.21	158.49	<8.0000E-05	NР	3.3400E-06	39,29-11	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2,5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7.35	. 0.17	<8.000E-03	NP	2.0000E+02		7,35				Subtotal	0.00000	3.5224E-01	9.5200E-03	1
											·	Total		3.5224E-01	9.5200E-03	
																1
149/1	4	8.21	155,49	<8.0000E-05	MP	3.3460E-06	39,29-11	0.20	NA	HONEMP	КP	C-14 H-3 Sr-80	1.00000E+01 1.00000E+01 5.00000E+01	5.0320E-02 5.0320E-02 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03	AS
		7,35	0.17	<8.000E-03	NP	2.0000E+02		7,35		•		Subtotal		3.6224E-01	9.6200E-03	

FORM 541A (10-98)

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE 2. MANIFEST NUMBER Envirocare of Utah, Inc. 4032-01-001 WASTE MANIFEST 3. PAGE 11 OF 24 PAGE(S)" CONTAINER AND WASTE DESCRIPTION (CONTINUATION) 18.WASTE CLASSIFI-PHYSICAL DESCRIPTION CLASSIFI-CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C 10. SURFACE 12. APPROXIMATE 13. CONTAINER
IDENTIFICATION
NUMBER /
GENERATOR
ID NUMBER(8) INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBg) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT AND CONTAINER WEIGHT SURFACE CONTAMINATION WASTE WASTE SOLIDIFICATION CONTAINER DESCRIPTION VOLUME(S) IN CONTAINER (m3) (FT3) VOLUME RADIATION LEVEL DESCRIPTOR (See Note 2 & Note 2A) MBo/100 pm2 dom/100 cm2 OR STABILIZATION CHEMICAL FORM %
MEDIA CHELATING AGENTICHELATING (See Note 1 & Note 1A) (ft3) (See Note 3) AGENT F>0.1% mSv/tv ALPHA RADIONUCLIDES 3.5224E-01 9.5200E-03 Total 1.00000E+01 1.00000E+01 5.00000E+01 180/1 39.29-H C-14 H-3 Sr-90 NONEMP NA 0.21 156.49 <8.0000E-05 3.3400E-06 0.20 NP 3.5224E-01 7.35 9.5200E-03 <8.000E-03 Subtotal 0.17 2.000012+02 7.35 3.5224E-01 9.5200E-03 Total 1.00000E+01 1.00000E+01 5.00000E+01 39,29-H NA NONE/NP 0.21 158.49 <8.000085-65 3.3400E-06 H-3 Sr-90 0.20 NP 3.5224E-0 9.5200E-03 7.35 <8.000E-03 2.0000E+02 0.17 7.35 Subtotal 9.5200E-03 3.5224E-01 Total 39,29 H NONE/NE NA 0.21 156,49 <8.0000E-05 3.3400E-08 0.20 H-3 Sr-90 KР 7.35 3.5224E-01 9.5200E-03 0.17 <8.000E-03 2.0000E+02 Subtotal 7.35 3.5224E-01 9.5200E-03 Total 1.3600E-03 1.3600E-03 6.8000E-03 1.00000E+01 1.00000E+01 5.00000E+01 166/1 39,29-H NONE/NP C-14 H-3 Sr-80 NA 0.21 156.49 <8.0000E-05 3.3400E-00 0.20 3.5224E-01 7.35 0.17 <8.000∰-03 2.0000E+02 7,35 Subtotal 9.5200E-03 3.5224E-0 9.5200E-03 Total

FORM 541A (10-98)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

		٠.		CONTAINC	D AND WAS	TE DECON	PTION (CONTINL	IATION!					3. PAGE 12 OF	24 PAGE(S)	
	DISPOSALCON	TAINER DESC	RIPTION	LUMIAIRE	K ANU WAS	TE DESCR	PILON ICCININI		WASTE DESCRIPTION	N FOR EACH WAST	E TYPE IN C	ONTAINER			6,WASTE
S. CONTAINER IDENTIFICATION NUMBER / GENERATOR	G. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8. WASTE AND CONTAINER WEIGHT	9. 8URFACE RADIATION LEVEL	MBari	ACE IINATION 00 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (RS): (FT3)	80LIDIFICATION OR STABILIZATION	14. CHEMICAL DE CHEMICAL FORM CHELATING AGENT	WEIGHT	INDMIDUAL RADIO CONTAINER TOTAL	IOLOGICAL DESCRIPTION NUCLIDES AND ACTIVITY (N OR CONTAINER TOTAL A ADIONUCLIDE PERCENT	ABOU AND CHIVITY	CATION AS-Class Stable AU-Class Unstabl 8-Class C-Class
ID NUMBER(S)	Nate 1A)	(m3) (m3)	(kg)	m\$vhr mremfu	ALPHA	BETA- GAMMA]	(F13)	(000000)	1	(F>0.1%	RADIONUCLIDES	CVqm M8q	l mci i	C-Class
1694	4	0.21		<5.0000E-05	NP	3.3400E-06	39,29-H	0,20	NA	. NONE/NP	КIP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 5.0320E-0: 000E+01 5.0320E-0: 000E+01 2.5160E-0	1.3600E-03 2 1.3600E-03 6.8000E-03	AS
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35				Subtotal	3.5224E-0	9.5200E-03	
]			Total	3.5224E-0	9.5200E-03	
	<u> </u>													4 20000 03	
175/1	4	0.21	. 156,49	<8.0000E-05	NP	3.3400E-08	39,29-H	0.20	NA	NONE/NP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	000E+01 5.0320E-0 000E+01 5.0320E-0 000E+01 2.5160E-0	2 1.3600E-03 2 1.3600E-03 1 6.8000E-03	A3 .
AL-A-RUSSIA		7.35	, 0.17	<8.000E-03	NP	2.00008+02		7,35				Subtotal	3.5224E-0		
		<u> </u>]			Total	3.5224E-0	1 9.5200E-03	•
· · · · · · · · · · · · · · · · · · ·		<u> </u>		<u> </u>									1000E+04 4 0700E 6	0 4 5400E 04	
180/1	14	0.21	68.77	<8.0000E-05	NP	1.3400E-06	20-11	0.20	NA	HONE/NP	NP	C-14	000E+01 1.8798E-0 000E+01 1.8798E-0 000E+01 8.3990E-0	2 4.5400E-04 2 4.5400E-04 2 2.2700E-03	AS
		7.38	0.07	<8.000E-03	MP	2.00008+02		7.35				Subtotal	1.1759E-0	3.1780E-03	
		<u> </u>	<u> </u>									Total	1.1769E-0		ĺ
		ļ			<u> </u>								2005:04 0 2005 0	0.07005-00	
1897	4	0.21	247.21	<8.0000E-05	NP.	3.3400E-08	11-02,05	0.20	NA	NONEMP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	1000E+01 8.3990E-0 1000E+01 8.3990E-0 1000E+01 4.1810E-0	2 2.2700E-03 2 2.2700E-03 1 1.1300E-02	AS.
		7.35	0.27	<8.000E-03	, 189	2.00006+02		7,35				Subtotal _.	5.8608E-0	1 1.5840E-02	
]			1		Total	5.8608E-0	1 1.5840E-02	Į
								<u> </u>						1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
16771	4	0,21	247.21	<8.0000E-05	NP	3.3400E-08	29,39-H	0.20	NA	NONE/NP	NP	C-14 1.00 H-3 1.00 Sr-90 5.00	1000E+01 8.3990E-0 1000E+01 8.3990E-0 1000E+01 4.1810E-0	2 2.2700E-03 2 2.2700E-03 1 1.1300E-02	AS
		7.35	0.27	<8.000E-03	NP	2.0000E+02	<u> </u>	7.35				Subtotal	6.8608E-0	1 1.5840E-02	

FORM 541A (10-98)

FORM 541A

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE Envirocare of Utah, Inc. 2. MANIFEST NUMBER 4032-01-001 **WASTE MANIFEST** 3. PAGE 13 OF 24 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) PHYSICAL DESCRIPTION CI ASSIFI-CASSIPI-CATION AS-Class A Stable AU-Class A SURFACE 12. APPROXIMATE 13. CONTAINER DENTIFICATION AND CONTAINER WEIGHT SURFACE RADIATION LEVEL CONTAMINATION
MBo/100 cm2
dpm/100 cm2 WASTE SOLIDIFICATION INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER DESCRIPTION (See Note 1 & Note 1A) VOLUME(S) IN CONTAINER (m3) (FT3) VOLUME DESCRIPTOR (See Note 2 OR STABILIZATION CHEMICAL FORM %
MEDIA CHELATING AGENT CHELATING CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY
AND RADIONUCLIDE PERCENT GENERATOR ID NUMBER(S) & Note 2A) (See Note 3) AGENT IF>0.1% mSv/hr monv/hr BETA ALPHA RADIONUCLIDES 5.8608E-01 1.5840E-02 Total 188/1 39,29-11 NONE/NP C-14 H-3 Sr-90 NA 0.21 156,49 <8.00002-05 3,3400E-08 0.20 NP 3.5224E-01 9.5200E-03 7.35 0.17 <8.000E-03 2.0000E+02 7.35 Subtotal 3.5224E-01 9.5200E-03 Total 5.0320E-02 5.0320E-02 2.5160E-01 1.3600E-03 1.3600E-03 6.8000E-03 1.00000E+01 1.00000E+01 5.00000E+01 19011 39,29-11 NONEMP H-3 Sr-90 0.21 156,49 <8.0000E-05 3.3400E-06 0.20 3.5224E-01 9.5200E-03 7.35 2.0000E+02 Subtotal 0.17 <8.000E-03 7.36 Total 3.5224E-01 9.5200E-03 C-14 H-3 Sr-90 1.00000E+01 1.00000E+01 5.00000E+01 191/1 39,29-H NONEMP 0.21 156,49 <8.0000E-06 3.3400E-08 0.20 NP 7.35 3.5224E-01 9.5200E-03 0.17 <8.000E-03 2.00005+02 Subtotal 7.35 9.5200E-03 Total 3.5224E-01 29.39-H MONE/NE 0.21 292.57 <8.0000E-05 3,3400E-00 0.20 H-3 Sr-80 7.35 0.32 <8.0002-03 2.0000E+02 7.35 Subtotal 7.0448E-01 1.9040E-02 7.0448E-01 Total 1.9040E-02

FORM 541A (10-86)

FORM 541A	,		l	INIFORI			RADIOACTI	VE				Envirocare of U	tah, Inc. 2	. MANIFEST N 4032-01-0		
j .						E MANI								, PAGE 14 OF		•
	DISPOSAL CO	NTAINER DESC	RIPTION	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINI	MOITAL	WASTE DESCRIPTION	ON EAS BACK WAS	ve vose are	Annables .		, PAGE 14 UP	ZA PAGE(S)	16.WASTE
5. CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME (m3)	8. WASTE AND CONTAINER WEIGHT	8 SURFACE RADIATION LEVEL	_MBo/	MENATION 100 cm2 00 cm2	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCR 12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	IPTION_	14. CHEMICAL DE	WEIGHT	INDIVIOUAL CONTAINER	5. RADIOLOGICA RADIONUCLIDES TOTAL: OR CON AND RADIONUCI	AND ACTIVITY (MI	BQ) AND TIVITY	CLASSIFI- CATION AS-Class A Stable AU-Class A Unstable
ID NUMBER(S)	Note 1A)	(63)	(kg) (ton)	mSvihr mmohr	ALPHA	BETA- GAMMA		(FT3)			(F>0.1%	RADIONUCLIDES	pCVgm	MBq	mCl	8-Class B C-Class C
196/1	1	0.21	292.67	<8,0000E-05	КP	3.340gE-06	29,39-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
	·	7.36	0.32	<8.000E-03	NP	2.0000E+02		7.35			[Subtotal		7.0448E-01	1.9040E-02	
						ļ						Total		7.0448E-01	1.9040E-02	
197/1	4				<u> </u>											
1371		0.21	292,57	<0.0000E-05	NP	3.3400E-08	29,39-H	0.20	NA .	NONE/NP	NDP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	1 1.0064E-01 1 1.0064E-01 1 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.35	0.32	<6.0008-03	М₽	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	
							i i					Total		7.0448E-01	1,9040E-02	
201/1	4	<u></u>					29,39-H		· · · · · · · · · · · · · · · · · · ·							
		0,21	292.57	<8.0000E-05	NP	1,3400E-06	23,3041	0.20	NA .	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+0 1.00000E+0 5.00000E+0	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.36	0.32	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	
	•											Total		7.0448E-01	1.9040E-02	
												!				
202/1	4	0.21	292.57	<8.0000E-05	NP	3.3400E-06	29,39-H	0.20	NA	HONE/HP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.35	0.32	<8.000E-03	KP	2.0000E+02		7.35	•			Subtotal		7.0448E-01	1.9040E-02	
												Total		7.0448E-01	1.9040E-02	
	•									· ·		,				
203/1	4	0.21	292.57	<8.0000E-05	NP	3.34002-06	29,39-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7,35	0.32	<8,000E-03	NP	2.0000E+02	,	7.35			Re	Subtotal	J.40000CT01	7.0448E-01	1.9040E-02	

FORM 541A (10-96)

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

					AAY2 I	E MANI	FESI						ſ	3. PAGE 15 OF 2	A DAGE(S)	
	DISCUSALINA	NTAINER DESC	RIPTION	CONTAINE	RAND WAS	TE DESCR	PTION (CONTINI	UATION)	Water are control	ON FOR EACH WAS	a contract	Sama laro		3. FAGE 10 OF 2	14 FAGE(0)	HOWASTE
	T	1						PHYSICAL DESCRI	PTION	14. CHEMICAL DE	SCRIPTION	ONTAINER · 15	S. RADIOLO	GICAL DESCRIPTION		CLASSIFI- CATION
CONTAINER DENTIFICATION NUMBER / GENERATOR 10 NUMBER(8)	CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) (m3)	8. WASTE . AND . CONTAINER WEIGHT . (kg) . (loc)	SURFACE RADIATION LEVEL MSV/MY	10. SURA CONTAN MBo/1 dpn/10	INATION 30 cm2 10 cm2 BETA-	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (F13)	SOLIDIFICATION	CHEMICAL FORM CHELATING AGENT	WEIGHT % CHELATING AGENT IF>0.1%	CONTAINER	TOTAL; OR AND RADIO	DES AND ACTIVITY (ME CONTAINER TOTAL ACT NUCLIDE PERCENT	WITY	AS-Class A Stable AU-Class A Linstable B-Class B C-Class C
		 	(tord	- meanty		GAMMA		 		 		RADIONUCLIDES	pCi/gm	MBq	mCl	
				•								Total	.	7.0448E-01	1.9040E-02	
209/1	4	0.21	747,21	<8.0000E-05	КP	3.3400E-06	29,39-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	1.00000E 1.00000E 5.00000E	E+01 8.3990E-02	2.2700E-03 2.2700E-03 1.1300E-02	AS
		7.35	0.27	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		5.8608E-01	1.5840E-02	
												Total .		6.8608E-01	1.5840E-02	
								<u> </u>		<u> </u>						
211M •	1	0.21	292.57	<8,0000E-08	NP	3,3400E-06	29,39-H	0.20	NA	NONE/NP	NF	C-14 H-3 Sr-90	1.000000	E+01 1.0064E-01 E+01 1.0064E-01 E+01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.35	0.32	<8.000E-03	NP	2.0000E+02		7.35	<u>.</u>			Subtotal		7.0448E-01	1.9040E-02	
•												Total		7.0448E-01	1.9040E-02	
	<u> </u>															1
212/1	4	0.21	292,67	<8.0000E-05	NP	3.3400E-06	29,39-H	0.20	NA	NONEMP	ИP	C-14 H-3 Sr-90	1.000008 1.000008 5.000008	E+01 1.0064E-01 E+01 1.0064E-01 E+01 8.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.36	0.32	<8.000E-03	NР	2.0000E+02		7.35				Subtotal		7.0448E-01	1.9040E-02	
									!	1		Total		7.0448E-01	1.9040E-02	
													·			
214/1	4	0.21	292,57	<1.0000E-06	NP	3.3400E-08	29,39-11	0.20	NA	NONEMP	HEP	C-14 H-3 Sr-80	1.00000E 1.00000E 5.00000E	E+01 1.0084E-01 E+01 1.0064E-01 E+01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7,35	0.32	<8.000£-03	NP	2.000001102		7.35				Subtotal		7.0448E-01	1.9040E-02	
	,											Total		7.0448E-01	1.9040E-02	
												<u>.</u>				
FORM 541A (10.98)																

FORM 541A (10-95)

· FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

													3. PAGE 16 OF	24 PAGE(S)
	DISPOSAL COM	TAINER DESC	RIPTION	CONTAINE	R AND WAS	TE DESCR	PTION (CONTINI	JATION)	WASTE DESCRIPTION	N FOR EACH WAS	E TYPE IN C	ONTAINER		I6.W
• ,		Γ	l .	1				PHYSICAL DESCR		14. CHEMICAL DE	SCRIPTION	15, RADIO	LOGICAL DESCRIPTION	CLA CA AS-
S. CONTAINER DENTIFICATION NUMBER / GENERATOR DESCRIPTION (See Note 1 & Note 14)		7. VOLUME (m3) (R3)	8. WASTE 8. SURFACE CONTAINER RADIATION LEVEL.		N <u>Μθα/100 απ2</u>		11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE 13. WASTE SOLIDIFICATION VOLUME(S) IN OR STABILIZATION CONTAINER MEDIA (Ins) (See Note 3)	CHÉMICAL FORW CHELATING AGENT	AGENT	CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT IT			
ID NUMBER(S)	Note 1A)	(113)	(kg)	<u>mSyfte</u>	ALPHA	BETA- GAMMA	1	(FT3)		Ì	F>0.1%	RADIONUCLIDES pC	Vgm MBq	mCi Ui
218/1	4	0,21			NP	3.3400E-08	39,2941	0.20	NA	NONEMP	NP	C-14 1.000 H-3 1.000 Sr-80 5.000	00E+01 5.0320E-02 00E+01 5.0320E-02 00E+01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03
		7.36	. 0.17	<8.000E-03	ŃР	2.0000E+02		7.35	<u> </u>			Subtotal	3.5224E-01	9.5200E-03
												Total	3.5224E-01	9.5200E-03
22011	4	0.21	65,77	<8.0000E-05	NP	3.3400E-08	29-14	0.28	NA .	NONE/NP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 1.6798E-02 00E+01 1.6798E-02 00E+01 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03
		7.35	0,67	<8.000E-03	NP	2.000002+02		7.35				Subtotal	1.1759E-01	3.1780E-03
•					<u>.</u>]			Total	1.1759E-01	3.1780E-03
222A	· 4	0.21	292.57	<1.0000E-04	NP	3.3400E-08	29,39-11	0.20	NA .	NONEMP	NP	H-3 1.000 Sr-90 5.000	00E+01 1.0064E-01 00E+01 1.0064E-01 00E+01 5.0320E-01	2.7200E-03 AS 2.7200E-03 1.3600E-02
		7,35	0.32	<1.000E-02	NP	2.0000E+02		7.35				Subtotal	7.0448E-01	1.9040E-02
		·	ļ									Total	7.0448E-01	1.9040E-02
223H	4	0.21	292.57	<8.0000E-05	NP	3.3400E-08	29,39-H	0.20	MA	NONEMP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 1.0064E-01 00E+01 1.0064E-01 00E+01 5.0320E-01	2.7200E-03 AS 2.7200E-03 1.3600E-02
	•	7,35	0.32	<8.000E-03	NP	2.0000E+02		7.35	<u></u>	<u> </u>		Subtotal	7.0448E-01	1.9040E-02
												Total	7.0448E-01	1.9040E-02
	,													
2291	4	0.21	156.48	<8.0000E-05	NP	3.3400E-06	39,29-H	8.20	NA	NOKE/NP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	00E+01 5.0320E-02 00E+01 5.0320E-02 00E+01 2.5160E-01	1.3600E-03 AS 1.3600E-03 6.8000E-03
		7.35	0.17	<8.000E-03	NP	2.0000E+02		7.35				Subtotal	3.5224E-01	9.5200E-03

FORM 541A (10-98)

FORM 641A Envirocare of Utah, Inc. 2. MANIFEST NUMBER UNIFORM LOW-LEVEL RADIOACTIVE 4032-01-001 **WASTE MANIFEST** 3. PAGE 17 OF 24 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) PHYSICAL DESCRIPTION

12. APPROXIMATE IS CULDIFICATION

WASTE IS OUT TO CHEMICAL FORM

AND INVESTIGATION CHEMICAL FORM

AND INVESTIGATION CHEMICAL FORM

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AND INVESTIG C ARRIFL 15. RADIOLOGICAL DESCRIPTION B. WASTE SURFACE CONTAMINATION 9. SURFAÇE AND CONTAINER WEIGHT INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MEQ) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT CONTAINER WASTE CONTAINER DESCRIPTION VOLUME(S) IN CONTAINER (ms) (F13) IDENTIFICATION NUMBER/ VOLUME RADIATION MBa/100 cm2 dpm/100 cm2 DESCRIPTOR (See Note 2 & Note 2A) GENERATOR ID NUMBER(8) (See Note 1 & Note 1A) AGENT IF>0.1% BETA ALPHA . mCl RADIONUCLIDE Total 3.5224E-01 9.5200E-03 227/1 C-14 H-3 Sr-90 NONEMP 39,29-H 0.21 158.49 <8.0000E-05 3.3400E-04 0.20 7.35 0.17 <8.000E-03 3.5224E-01 9.5200E-03 2.0000E+02 Subtotal 7,35 3.5224E-01 9.5200E-03 Total 2.7200E-03 2.7200E-03 1.3600E-02 229/1 29.39-H NONEMP 0.21 292.57 <0.00002-05 3.3400E-08 0.20 H-3 Sr-90 7.35 <8.000E-03 7.0448E-01 1.9040E-02 0.32 2.0000E+02 7.35 Subtotal Total 7.0448E-01 1.9040E-02 2.2700E-03 2.2700E-03 1.1300E-02 230/1 29,39-# NONEMP C-14 H-3 Sr-90 0.21 247.21 <8.0000E-05 3,3400E-08 0.20 7.35 0.27 <8.000E-03 2.0000E+02 Subtotal 5.8608E-0 1.5840E-02 7.35 Total 5.8608E-01 1.5840E-02 2.7200E-03 2.7200E-03 1.3600E-02 29,39-H C-14 H-3 Sr-90 <8.0000E-05 0.21 292.57 3.3400E-08 0.20 7.0448E-0 1.9040E-02 Subtotal 7.35 <0.000E-03 2.0000E+02 7.35 Total 7.0448E-0 1.9040E-02

FORM \$41A (10-95)

FORM 541A

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

-3. PAGE 18 OF 24 PAGE(S)

				CONTAINE	RAND WAS	TE DESCR	IPTION (CONTINL	JATION)					-3.	PAGE 18 OF	24 PAGE(3)	
	DISPOSAL COR	ITAINER DESC	RIPTION		T			PHYSICAL DESCR		ON FOR EACH WAS 14. CHEMICAL DE	E TYPE IN C		S. RADIOLOGICAL	DESCRIPTION :		CLASSIFF
8. CONTAINER O'ENTEFICATION NAMER / GENERATOR TO NUMBER(S)	G. CONTAINER DESCRIPTION (See Note 1 8. Note 1 1A)	7. VOLUME (m3) (f(3)	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL mSvfrr	MBatt dpm/18	FACE MINATION COLOTIZ DO CITIZ	.11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12 APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	SOLIDIFICATION		WEIGHT	INDIVIDUAL CONTAINER	RADIONUCLIDES / TOTAL: OR CONT. AND RADIONUCLI	AND ACTIVITY (ME AINER TOTAL ACT		CATION AS-Class Stable AU-Class Unstable B-Class C-Class
2341		(1.12)	_(kg) _(lon)	menvhr	ALPHA	GAMMA	<u> </u>		<u> </u>		[F90,176	RADIONUCLIDES	pCl/gm′	MBq	mCl	
23471	4	0.21	65.77	<8.0000E-06	NP	3.3400E-06	39-H	0.20	NA NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.6798E-02 1.6798E-02 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03	AS
	•	7,38	0.07	48.000E-03	NP	2.0000E+02		7.35				Subtotal		1.1759E-01	3.1780E-03	
							<u></u>					Total		1.1759E-01	3.1780E-03	
236/1	4	0.21	292,57	<8.0000E-05	МР	3.34008-06	29,39-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	1.0064E-01 1.0064E-01 5.0320E-01	2.7200E-03 2.7200E-03 1.3600E-02	AS
		7.35	0.32	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		7.0448E-01		٠l
												Total		7.0448E-01	1.9040E-02	
									}.	1	}		}			j
238/1	4	0.21	247.21	<8.0000E-05	NP	3.3400E-06	29,38-11	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 8.00000E+01	8.3990E-02 8.3990E-02 4.1810E-01	2.2700E-03 2.2700E-03 1.1300E-02	AS
		7.39	0.27	<8.000E-03	NP	2.0000E+02		7.38				Subtotal		5.8608E-01	1.5840E-02	.1
				<u> </u>								Total		5.8608E-01	1.5840E-02	
	·]	·]	j .						
242/1	4	0.21	201.85	<1.0000E-04	NP	3.3400E-06	20,39-H	0.20	NA.	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	6.6970E-02 6.6970E-02 3.3569E-01	1.8100E-03 1.8100E-03 9.0700E-03	PA PA
· ·	·	7,35	0.22	<1.000E-02	NP	2,0000E+02		7.35				Subtotal		4.6953E-01	1.2690E-02	.4
												Total		4.6953E-01	1.2690E-02	
245/1	4	0,21	201.85	<1.0000E-04	NР	3.3400E-06	29,39-H	0.20	NA	NONE/NP	NP	C-14 H-3 Sr-90	1.00000E+01 1.00000E+01 5.00000E+01	6.6970E-02 6.6970E-02 3.3559E-01	1.8100E-03 1.8100E-03 9.0700E-03	AS
		7,35	0.22	<1.000E-02	NP	2.0000 E +02		7.35				Subtotal		4.6963E-01	1.2690E-02	.i

2. MANIFEST NUMBER Envirocare of Utah, Inc. FORM 541A **UNIFORM LOW-LEVEL RADIOACTIVE** 4032-01-001 **WASTE MANIFEST** 3. PAGE 19 OF 24 PAGE(5) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) DISPOSAL CONTAINER DESCRIPTION CLASSIFI IS. RADIOLOGICAL DESCRIPTION CLASSIPP CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C PHYSICAL DESCRIPTION 12. APPROXIMATE 13. SURFACE CONTAMINATION SOUDERCATION CHEMICAL FORM CHELATING AGENT 8. WASTE INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT SURFACE RADIATION AND CONTAINER WEIGHT WASTE WASTE CONTAINER IDENTIFICATION NUMBER / MBGH00.cm2 dpm/100.cm2 DESCRIPTOR (See Note 2 VOLUME(9) IN CONTAINER (m3) (F13) CHELATING CONTAINER VOLUME & Note 2A) (See Note 3) AGENT F>0.1% (See Note 1 & Note 1A) GENERATOR ID NUMBER(S) (m3) (#3) BETAmSvity ALPHA RADIONUCLIDES 4,6953E-01 1.2690E-02 Total 8.3990E-02 8.3990E-02 4.1810E-01 2.2700E-03 2.2700E-03 1.1300E-02 1.00000E+01 1.00000E+01 5.00000E+01 C-14 H-3 Sr-90 NONEMP 29,39-11 NA 247/1 0.21 247.21 <1.0000E-04 NP 3.34002-06 0.20 6.8608E-01 1.5840E-02 Subtotal 7,35 7,35 0.27 <1.000E-02 2.0000E+02 5.8608E-01 1.5840E-02 Total 4.5400E-04 4.5400E-04 2.2700E-03 1.00000E+01 -1.00000E+01 5.00000E+01 1.6798E-02 1.6798E-02 8.3990E-02 C-14 H-3 Sr-90 NONEMP 254/1 39-H 3.3400E-08 0.20 0.21 68.77 <1.0000E-04 NP 3.1780E-03 1.1759E-01 Subtotal Z.0000E+02 7.35 7.35 0.07 <1.000E-02 1.1759E-01 3.1780E-03 Total 1.8100E-03 1.8100E-03 9.0700E-03 6.6970E-02 6.6970E-02 3.3559E-01 29,39-H NONEMP C-14 H-3 Sr-90 NA 258/1 0.21 201,85 <1.0000E-04 3,3400E-00 0.20 4.6953E-01 1.2690E-02 Subtotal 7.35 <1.000E-02 2.0000E+02 7.35 1.2690E-02 4.6953E-01 Total 1.00000E+01 1.00000E+01 5.00000E+01 2.2700E-03 2.2700E-03 1.1300E-02 8.3990E-02 C-14 H-3 Sr-90 29.39-H NA HONE/NP 260/1 8.3990E-02 4.1810E-01 247.21 3.3400E-08 0.20 <1,0000E-04 0.21 NP 5.8608E-01 1.5840E-02 Subtotal 7.58 0.27 <1.000E-02 7.35 1.6840E-02 Total 5.8608E-01

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE Envirocare of Utah, Inc. 2. MANIFEST NUMBER 4032-01-001 **WASTE MANIFEST** 3. PAGE 20 OF 24 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER CLASSIFI-CATION AS-Class A Stable AU-Class A 15. RADIOLOGICAL DESCRIPTION 8. WASTE . SURFACE CONTAMINATION 12 APPROXIMATE 13. WASTE 8 9. SURFACE INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MEq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT CONTAINER WASTE SOLIDIFICATION WEIGHT DESCRIPTOR (See Note 2 & Note 2A) VOLUME(S) IN CONTAINER (mg) (F13) IDENTIFICATION NUMBER/ CONTAINER VOLUME CONTAINE RADIATION MBo/100 cm2 OR STABILIZATION CHEMICAL FORM % MEDIA (See Note 3) Linstable GENERATOR ID NUMBER(S) (See Note 1 & AGENT IF>0,1% mSvir menih (kg) ALPHA GAMMA RADIONUCLIDES C-14 H-3 Sr-90 29,39-11 NONE/NP 0,21 247.21 <1.0000E-04 3,3400E-06 0.20 NP 7.35 <1,000E-02 Subtotal 5.8608E-01 1.5840E-02 0.27 2.0000E+02 7.36 5.8608E-01 1.5840E-02 Total C-14 H-3 Sr-90 262/1 39-41 NONE/NE 0.21 <1.0000E-04 3,3400E-0 0.20 NP 1.1759E-01 3.1780E-03 Subtotal 7.35 <1.000E-02 2.0000E+02 7.35 1.1759E-01 3.1780E-03 Total

0.20

7.35

9,20

7.35

0.20

7,36

NA

29,39-H

29,39-H

29,38-H

3.3400F-06

2.0000E+02

3.3400E-00

2.0000E+02

3.3400E-08

2.0000E+02

6.6970E-02 6.6970E-02 3.3559E-01

4.6953E-01

4.6953E-01

4.6953E-01

4,6953E-01

6.6970E-02 6.6970E-02 3.3559E-01

4.6953E-01

1.8100E-03 1.8100E-03 9.0700E-03

1.2690E-02

1,2690E-02

1.8100E-03 1.8100E-03 9.0700E-03

1,2690E-02

1.2690E-02

1.8100E-03 1.8100E-03 9.0700E-03

1.2690E-02

1.00000E+01 1.00000E+01 5.00000E+01

C-14 H-3 Sr-90

Total

C-14 H-3 Sr-90

Total

C-14 H-3 Sr-90

Subtotal

Subtotal

Subtotal

NP

NP

NP

NONEMP

NONE/NP

FORM 541A (10-96)

287/1

263/1

0,21

7.35

0.21

7,35

0.21

201.85

0.22

201.85

0.22

201.85

0.22

<1.0000E-04

<1.000E-02

<1.0009€-04

<1.000E-02

<1.0000E-04

<1.000E-02

FORM 541A Envirocare of Utah, Inc. 2. MANIFEST NUMBER UNIFORM LOW-LEVEL RADIOACTIVE 4032-01-001 **WASTE MANIFEST** 3. PAGE 21 OF 24 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) 16.WASTE CLASSIFI-CATION AS-Class A Stable ALI-Class A HYSICAL DESCRIPTION 18. RADIOLOGICAL DESCRIPTION SURFACE CONTAMINATION 8. WASTE 12. APPROXIMATE 13. CONTAINER IDENTIFICATION NUMBER / GENERATOR ID NUMBER(S) AND CONTAINER WEIGHT SURFACE RADIATION LEVEL WASTE
VOLUME(S) IN
CONTAINER
(m3)
(F13) SOLIDIFICATION WEIGHT
OR STABILIZATION CHEMICAL FORM: %
MEDIA CHELATING AGENT CHELATING INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBQ) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT WASTE CONTAINER DESCRIPTION (See Note 1 & Note 1A) VOLUME MBn/100 cm2 dpm/100 cm2 CESCRIPTOR (See Note 2 Unstable 8-Class B C-Class C (m3) AGENT IF>0.1% & Note 2A) (See Note 3) (kg) m\$v/hr ALPHA RADIONUCLIDES mCi 4.6953E-01 1,2690E-02 Total 1.00000E+01 1.00000E+01 5.00000E+01 5.0320E-02 5.0320E-02 2.5160E-01 1.3600E-03 1.3600E-03 6.8000E-03 289/1 39,29-11 NA NONEMP AS 0.21 158.49 <1.0000E-04 3.3400E-08 H-3 Sr-90 0.20 NP 3.5224E-01 Subtotal 9.5200E-03 7.35 0.17 <1.000E-02 Z.0000E+02 7.35 3.5224E-01 9.5200E-03 Total 29,39-H 1.00000E+01 1.00000E+01 5.00000E+01 270/1 NONE/NP NA 0.21 201.88 <1.0000E-04 3.3400E-06 0.20 H-3 Sr-90 6.6970E-02 NP Subtotal 4.6953E-01 1.2690E-02 7.35 0.22 <1.000E-02 2.0000E402 7.35 4.6953E-01 1.2690E-02 Total 4.5400E-04 4.5400E-04 2.2700E-03 1.00000E+01 1.00000E+01 5.00000E+01 1.6798E-02 1.6798E-02 8.3990E-02 272/1 39-H NONEMP C-14 H-3 Sr-90 NA 3,3400E-08 0.21 65.77 <8.0000E-05 0.20 1.1759E-01 3.1780E-03 7.35 0.07 2,0000E+02 7.35 Subtotal 3.1780E-03 Total 1.1759E-01 1.00000E+01 1.00000E+01 6.00000E+01 3.3559E-02 3.3559E-02 1.6788E-01 9.0700E-04 9.0700E-04 4.5400E-03 C-14 H-3 Sr-90 273/1 39,29-H NONENP 0.21 111,13 <4.0000E-05 3.3400E-06 6.20 2.3510E-01 6.3540E-03 Subtotal 7.35 0.12 <4.000E-03 2,0000E+02 7.35 Total 2.3510E-01 -6.3540E-03

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER 4032-01-001

3. PAGE 22 OF 24 PAGE(S

•	•			CONTAINE	D AND WAS	TE NEGOD	IPTION (CONTINU	ATION)		٠.			3. PAGE 22 OF 2	24 PAGE(S)
	DISPOSAL CO	TAINER DESC	REPTION	LONG AND	- And Hos	TE 10-000	- III CALL		WASTE DESCRIPTION	N FOR EACH WAS	E TYPE IN C	ONTAINER		I6.V CL
S. CONTAINER IDENTIFICATION NUMBER / GENERATOR	6. CONTAINER DESCRIPTION (See Note 1 &	7. VOLUME	8, WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	_MBo/ti	FACE IINATION IO cm2.	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUMES) IN CONTAINER (FT3)	13. SOLIDIFICATION OR STABILIZATION		WEIGHT	INDIVIDUAL RADION CONTAINER TOTAL:	OLOGICAL DESCRIPTION ILICLIDES AND ACTIVITY (MB OR CONTAINER TOTAL ACT DIONUCLIDE PERCENT	Sc) AND AS STIVITY ALL
ID NUMBER(S)	Note (A)	(m3) (fG)	(tpn)	mSv/hr mrem/hr	ALPHA	BETA- GAMMA	1	(F13)	(330)(340)		IF>0.1%	RADIONUCLIDES PC	Wgm MBg I	mCi B.
280/1	4	0.21	45.77	1	ИP	3.3400E-06	28-H	0.20	NA NA	NONEMP	NP	C-14 1.000 H-3 1.000 Sr-90 5.000	000E+01 1.6798E-02 000E+01 1.6798E-02 000E+01 8.3990E-02	4.5400E-04 4.5400E-04 2.2700E-03
		7.35	9,07	<8.000E-03	KP	2.00005+02		7.38				Subtotal	1.1759E-01	3.1780E-03
												Total	1.1759E-01	3.1780E-03
												·		
285/1	4	0.21	156,49	<8.0000E-05	NP	3,3400E-08	39,29-H	0,20	HA .	NONE/NP	NP	C-14 1:000 H-3 1:000 Sr-90 5:000	000E+01 5.0320E-02 000E+01 5.0320E-02 000E+01 2.5160E-01	1.3600E-03 1.3600E-03 6.8000E-03
		7.35	0,17	<8.000E-03	NP	2.0000E+02		7,35				Subtotal	3.5224E-01	9.5200E-03
									·			Total	3.5224E-01	9.5200E-03
299/1	4	0.21	201.85	<1.0000E-04	Ŋ₽	3,3400E-06	29,39-11	0.20	NA	NONE/NP	NP	H-3 1,000	000E+01 6.6970E-02 000E+01 6.6970E-02 000E+01 3.3559E-01	1.8100E-03 A 1.8100E-03 9.0700E-03
·		7.38	0.22	<1.000E-02	КP	2.000012+02		7.38				Subtotal	4,6953E-01	1.2690E-02
												Total	4.6953E-01	1.2690E-02
												}		
300/1	4	0.21	156,49	<1.0000E-04	ΚР	3,3400E-08	59,29-H	0.20	NA	NONE/NP	MP	IH-3 11.000	000E+01 5.0320E-02 000E+01 6.0320E-02 000E+01 2.5160E-01	1.3600E-03 A 1.3600E-03 6.8000E-03
		7.36	0,17	<1,000E-02	NP :	2,0000E+02	·	7.36				Subtotal .	3.5224E-01	9.5200E-03
												Total	3.5224E-01	9.5200E-03
301/1		0.21	201,85	<1,0000E-04	NP	1,3400E-06	29,39-H	0.20	NA	NONE/NP	NP.	C-14 1.000 H-3 1.000 Sr-90 5,000	000E+01 6.6970E-02 000E+01 6.6970E-02 000E+01 3.3559E-01	1:8100E-03 A 1.8100E-03 9.0700E-03
		7.25	0.22	<1.000E-02	KP	2.0000E+02		7,35				Subtotal	4.6953E-01	

FORM 541A (10-98)

FORM 541A

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE Envirocare of Utah, inc 2. MANIFEST NUMBER 4032-01-001 **WASTE MANIFEST** 3. PAGE 23 OF 24 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) DISPOSAL CONTAINER DESCRIPTION CLASSIFI-CATION AS-Class A Stable AU-Class A PHYSICAL DESCRIPTION 12. APPROXIMATE 13. 114. CHEMICAL DESCRIPTION SURFACE & WASTE CONTAINER INDMIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL, OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT SURFACE CONTAMINATION WASTE WASTE SOLIDIFICATION WEIGHT CONTAINER DESCRIPTION (See Note 1 & Note 1A) IDENTIFICATION VOLUME VOLUME(S) IN CONTAINER (FT3) CONTAINER RADIATION MBartoo cm2 dpm/100 cm2 DESCRIPTOR OR STABILIZATION CHEMICAL FORM NUMBER / GENERATOR ID NUMBER(S) CHELATING (See Note 2 Unstable & Note 2A) (See Note 3) AGENT IF>0.1% B-Class B G-Class C m\$v/hr mremh REYA. (lep) ALPHA GAMMA RADIONUCLIDES Total 4.6953E-01 1.2690E-02 302/1 1.00000E+01 1.00000E+01 5.00000E+01 29,39-H C-14 H-3 Sr-90 6.6970E-02 NONEINP 0.21 201.85 <1.0000E-04 3.3400E-06 6.6970E-02 3.3559E-01 0.20 4.6953E-01 7.35 1,2690E-02 0.22 <1.000E-02 2.0000E+02 7,35 Subtotal 4.6953E-01 1.2690E-02 Total 304/1 39,29,L-HL 3.3559E-02 3.3559E-02 1.6798E-01 9.0700E-04 9.0700E-04 4.5400E-03 NONEMP C-14 H-3 Sr-90 0.21 111.13 <6.0000E-05 3,34008-06 0.20 6.3540E-03 7.35 0.12 <8.000E-03 2.0000E+02 Subtotal 2.3510E-01 7.35 2.3510E-01 6.3540E-03 Total 305/1 39-H 1.6798E-02 1.6798E-02 8.3990E-02 NONEMP C-14 H-3 Sr-90 0.21 65,77 <8.0000E-05 3.3400E-06 0.20 MP 7.35 0.07 <8.000E-03 2.0000E+02 Subtotal 1.1759E-01 3.1780E-03 7.35 Total 1.1759E-01 3,1780E-03 306/1 1.00000E+01 1.00000E+01 5.00000E+01 4.5400E-04 4.5400E-04 2.2700E-03 NONEMP 1.6798E-02 1.6798E-02 8.3990E-02 0.21 65,77 <8.00005-06 3.3400E-06 0.20 H-3 Sr-90

7.35

Subtotal

Total

1.1759E-01

1.1759E-01

3.1780E-03

3.1780E-03

FORM 541A (10-66)

7.35

0.07

<8.000E-03

2.0000E+02

FORM 541A UNIFORM LOW-LEVEL RADIOACTIVE Envirocare of Utah, Inc. 2. MANIFEST NUMBER 4032-01-001 **WASTE MANIFEST** PHYSICAL DESCRIPTION FOR EACH WASTE TYPE IN CONYAINER

PHYSICAL DESCRIPTION 14. CHEMICAL DESCRIPTION

12. APPROXIMATE 13.

WASTE
SOLIDIFICATION
CONTAINER
CONTAINER
MEDIA
(See Note 3)

(See Note 3) 3. PAGE 24 OF 24 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) IGWASTE CLASSIFI-CATION AS-Class A Stable AU-class A Unstable B-Class & C-Class C 8. WASTE AND CONTAINER WEIGHT SURFACE
CONTAMINATION
MEG/100 cm2
dpm/100 cm2 9. SURFACE RADIATION LEVEL WASTE DESCRIPTOR (See Note 2 & Note 2A) INDMOUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT CONTAINER EDENTIFICATION NUMBER / GENERATOR ID NUMBER(9) CONTAINER DESCRIPTION (See Note 1 & Note 1A) VOLUME mSvite ALPHA RADIONUCLIDES mCi 4.5400E-04 4.6400E-04 2.2700E-03 GAMMA NONE/NP 309/1 39-H NA 0.21 65,77 <4.0000E-05 NP 3.3400E-06 0.20 NP Subtotal 1.1758E-01 3.1780E-03 <8.000E-03 2.000000+02 7,36 1.1759E-01 3.1780E-03 Total 4.0035E+01 1.0820E+00 Shipment Totals 21.63 17559.99 757.09 19.11

Truk PA 001 Tales E-40424 PWF 9333 Tack MA 002 Track TN 39577 T16070a 003 Truch MA Trale TN 2270-T160842

6091 (TRUCTOR) 1 /28 will ~ 1800 las. # 1077 (Trailer) Tank #1 PART TRucking Trailin (OHIX) PUF9333 JUNE (DA) AE-40424 60 9× 8# 10 21 50 223 24 23 103 total 304 -5 260 36

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Teales # 230084

	F	k No, 2 Panklin E (MA) 3957	NV, (TRO	ARRIVE	(DIONNA	Tamby (Treaty) ron MA Corplexaldoso	
12345	145 52 248 102 15	198 3) 124 76 30	150.	308 310 279 307 5	189 247424 290 311 33	69 65 66	
67891011	61 38 942	34 78 119	167 163 32 208	282	128 313 53 181	103	The second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second secon
12745	1822811	10 1136 172	168 125 192 170 10829	14 112 20	281 55624		
13	4	195 258 26 165 20,5	798 298 244 88	292 124 296 45	54	·	
							;

87

Herivel TRuck No. 3 ARI Tearly Licens #(TN) T/60842 Tractor Lucine # 1 Loading 5 Stepted 2200 Family ENV.

FORM 540 Env UNIFORM LOW-LEVEL RADIOACTIVI WASTE MANIFEST	trocare of Utah, Inc.	U.S. Amay Co St. Alban's V/	nd Lindea Bivd			STAL	MENT LD, NUMBER BAN-4032-01-001 COLLECTOR PROCESSOR	7. FORM 540 AND 540A FORM 541 AND 541A FORM 542 AND 542A ADDITIONAL INFORM		PAGE(S) 12 PAGE(S) 100 PAGE(S) None PAGE(S)	8. MANFEST NUM (Use this numbe (Bages) STALBAN-40:	ron all continuation .
SHIPPING PAPER		USER PERMI	TNUMBER		NT NUMBER	d X	GENERATOR TYPE (Specify) G	8. CONSIGNEE - Name	and Facility Address	•	CONTACT Shipping and Receiv	ring
EMERGENCY TELEPHONE NUMBER (Include Area Code) 1-800-425-6878	•	CONTACT		1			EPHONE NUMBER	Envirocere of Utah, Inc Clive Disposal Site	•		TELEPHONE NUMBE	R (Include Area Code)
ORGANIZATION Franklin Environmental Services, inc.	•	Mr. Hens H	ioneriah				ude Area Code) 10-962-4972	interstate 80, Exit 49 Clive, UT 84029			(435)884-0155	
2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? 8. TOTAL NUMBER OF		US Bulk Tran				EPA NA	LD. NUMBER	SIGNATURE - Authoriz	ed consignee acknowles	fging waste receipt	DATE	
PACKAGES IDENTIFIES ON THIS MANIFEST YES	. se	205 Permista Eria, PA 16S					PPING DATE			. CERTIFICATION		
A DOES EPA REGULATED YES EPA MANIFEST NUMBER WASTE REQUIRING A	<u> </u>	CONTACT	<u> </u>			TEL	EPHONE NUMBER lude Ares Code) 189-384-6151	This is to certify that the hin proper condition for tran- certifies that the materials disposal as described in a	am riossiflari nankarar	i madrari and ishalari i	and era in proper concept	n ing iminsportation and i
MANIFEST ACCOMPANY X NO NA NA NA NA NA NA NA NA NA NA NA NA NA		SIGNATURE	- Authorized carrier acknowled	iging waste i	receipt	DAT		AUTHORIZED SIGNATI	JRE ·	TITLE		DATE
U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information.	12. DOT LABEL "RADIDACTIVE"	13. TRANSPORT INDEX	14, PHYSICAL AND CHEMICAL FORM				15. INDIVIDUAL IDIONUCLIDES	TOTAL F MBq	18. PACKAGE ACTIVITY MCI	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
US DOT Exempt, Non-Regulated Material	NA .	NA	Solid /NA		C-14	H-3	Sr-90	6.4787E-01	1.7510E-02	NA	245, LBS; 7.35 F13	001
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA		C-14	H-3	Sr-90	3.2375E-01	8.7500E-03	NA	145. LBS; 7.35 FT3	002
US DÖT Exempt, Non-Regulated Material	NA	NA	Solid /NA		C-14	Н-Э	Sr-90	3.2375E-01	8.7500E-03	NA	145. LBS; 7.35 F13	003
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA		C-14	H-3	Sr-90	3.2375E-01	8.7500E-03	NA	145. LBS; 7.35 FT3	004
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA		C-14	H-3	Sr-90	3.2375E-01	8.7600E-03	NA	145. LBS; 7.35 FT3	005
US DOT Exempt, Non-Regulated Material	NA .	NA	Solid /NA		C-14	H-3	Sr-90	3.2375E-01	8.7500E-03	NA	145. LBS; 7.35 FT3	006
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	•	C-14	Н-3	Sr-90	8.4787E-01	1.7510E-02	NA.	245. LBS; 7.35 FT3	007
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA		C-14	H-3	Sr-90	6.4787E-01	1.7510E-02	NA .	245. LBS; 7.35 FT3	008
FOR CONSIGNEE USE ONLY	Record Waste Descr Contamination or Le Unexpected Exposur Labels, Markings, et Container Integrity in Other	akage Detec re Rales Det c. Inadequate radequate	quate A ted 8. ected 8. c. D.	hazardor centificar TITUE: (represer WASTE all respe	OOUS MATER us wasts, this tion as require Upon accepts nisdons hereir MATERIAL: sots and in so NIFICATION: results from th	shipment d by 40 C nce at the shall the Generate contance Generate e failure	it is also accompanied by CFR 268.1. e disposal alte by Environ enveron transfer from Generation transfer from Generation and the state of the Waste Material to of the Waste Materials to of the Waste Materials to	arrants that Weste Material a separate and completed as parate and completed are of Utah, inc., and all agenerator and be vested in Er to that all data set forth in mmental laws, rufee, regular refrocare of Utah, inc., its at ordorm in all material resper day prescribed by the Desay	hazardous waste mentic propriate regulatory suf- whocere of Utah, inc. is (UNIFORM LOW-LEV loins and Emvirons of U floors, employees and se icts to the data supplied icts to the data supplied	net, along with the appr horities, title to the War FEL PADIOACTIVE W/ Jizh, Inc.'s facility licen gents against all losses on the (UNIFORM LO)	opriate land-disposal rest one Material which conform LETE MANUFEST) are true generated by the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the secon	iction notice and/or is to Generator's s and correct in if such losses or WASTE

FORM 540 (10-65)

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST SHIPPING PAPER (CONTINUATION)

MANIFEST NUMBER
(Use this number on all continuation pages)
STALBAN-4032-01-001

LIS, DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper chipping name, hazard class, UN ID number, and any additional information	12. DOT LABEL "RADIOACTIVE"	19. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		IND: RADIO	16. VIDUAL NUCLIDES	TOTAL PAG MBq	16. KAGE ACTIVITY INCI	LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
US DOT Exempt, Non-Regulated Material	, NA	NA	Solid /NA	C-14	H-3	Sr-90	6.4787E-01	1.7510E-02	·.NA	245. LBS; 7.35 FT3	009
JS DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	5.4787E-01	1.7510E-02	NA .	245. LBS; 7.35 FT3	010
S DOT Exempt, Non-Regulated Material	NA .	NA	Solid /NA	C-14	H-3	Sr-90	5.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	011
S DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	8.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	012
S DOT Exempt, Non-Regulated Material	NA	NĀ	Solid /NA	C-14	н-з	Sr-90	8.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	013
S DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	5.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	014
IS DOT Exempt, Non-Regulated Matertal	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	5.4787E-01	1.7510E-02	-NA	245. LBS; 7.95 FT3	015
S DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	5.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	016
S DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	6.4787E-01	1.7510E-02	NA	245. LBS; 7.35 F13	017
S DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-80	1.6206E+00	4.3800E-02	NA	545. LBS; 7.35 FT3	018
S DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	1.6206E+00	4.3800E-02	NA	545. LBS; 7.35 FT3	019
S DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	6.4787E-01	1.7510E-02	NA	245. LBS; 7.35 F73	020
S DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	6.4787E-01	1.7510E-02	NA	245. LBS; 7.35 F13	021
S DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	6,4787E-01	1.7510E-02	NA	245. LBS; 7.35 F13	022
S DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	C-14	H-3	Sr-90	9.7273E-01	2.6290E-02	NA	345. LBS; 7.35 FT3	023
S DOT Exempt, Non-Regulated Material	NA.	VA.	Solid /NA	C-14	H=3 ··	Sr-90	6,4787E-01	1.7510E-02	NA NA	245. LBS; 7.35 FT3	024
S DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	C-14	H-3	Sr-90	6.4787E-01	1.7510E-02	NA	245, LBS; 7,35 FT3	025
S DOT Exempt, Non-Regulated Material	NA NA	VA	Solid /NA	C-14	Н-3	Sr-90	8.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	026

FORM 540A

FORM 540A

UNIFORM LOW-LEVEL RADIOACTIVE

WASTE MANIFEST

SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Iric.

a. MANIFEST NUMBER
(Use this sumber on all continuation
pages)
STALBAN-4032-01-001

AGE 3 OF 4 PAGE

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U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazzard class, UN ID number, and any additional information	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM		15, INDIVIDUAL DIONUCLIDES		16. KAGE ACTIVITY MCI	17. L9A/SCO CLASS	18, TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	C-14 H-3	Sr-90	8.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	027
US DOT Exempt, Non-Regulated Material	NA	NA .	Solid /NA	C-14 H-3	Sr-90	6.4787E-01	1.7610E-02	NA	245. LBS; 7.35 FT3	028
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	C-14 H-3	Sr-90	6.4787E-01	1.7510E-02	NA	245. LBS; 7.35 F13	029
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	C-14 H-3	Sr-90	6.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	030
US DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14 H-3	Sr-90	8.4787E-01	1.7510E-02	NA NA	245. LBS; 7.35 FT3	031
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	C-14 H-3	Sr-90	6.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	032
US DOT Exempt, Non-Regulated Material	NA .	NA	Solid /NA	C-14 H-3	Sr-80	8.4787E-01	1.7510E-02	ŅĀ	245. LBS; 7.35 FT3	033
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	C-14 H-3	Sr-90	B.4787E-01	1.7510E-02	NA	245. LBS; 7,35 FT3	034
US DOT Exempt, Non-Regulated Material .	NA	NA	Solid /NA	C-14 H-3	Sr-90	8.4787E-01	1.7510E-02	NA.	245. LBS; 7,35 FT3	035
US DOT Exempt, Non-Regulated Material	NA	NA	Solid MA	C-14 H-3	Sr-90	5.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	036
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	C-14 H-3	Sr-90	5.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	037
US DOT Exempt, Non-Regulated Material	NA	NA	Solid NA	C-14 H-3	Sr-90	1.6206E+00	4.3800E-02	NA	545. LBS; 7.35 FT3	038
US DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14 H-3	Sr-90	1.6206E+00	1.3800E-02	NA	545. LBS; 7.35 FT3	039
US DOT Exempt, Non-Regulated Material	NA	NA.	Solid /NA	C-14 H-3	Sr-90	6.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	040
US DOT Exempt, Non-Regulated Material	NA	NA .	Solid /NA	C-14 H-3	Sr-90	3.2375E-01	8.7500E-03	NA NA	145. LBS; 7,35 FT3	041
US DOT Exempt, Non-Regulated Material	NA NA	NA .	Solid /NA	C-14 H-3	Sr-90	8.4787E-01	1.7510E-02	NA	245. LBS; 7.35 FT3	042
US DOT Exempt, Non-Regulated Material	. NA	NA	Solid /NA	C-14 H-3	Sr-90	1.9425E+00	5.2500E-02	NA	645. LBS; 7.35 FT3	043
US DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14 H-3	Sr-90	1.6206E+00	4.3800E-02	NA NA	545. LBS; 7.95 F13	044

FORM 540A

UNIFORM LOW-LEVEL RADIOACTIVE

WASTE MANIFEST

SHIPPING PAPER (CONTINUATION)

Envirocare of Utah, Inc. 9. MANIFEST NUMBER (Use this number on 43 continuation pages).

STALBAN-4032-01-001

AGE 4 OF 4 PAGE

					<u> </u>						
 U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper altipping name, hazard class, UN ID number, and any additional information 	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14, PHYSICAL AND CHEMICAL FORM		INDI	15. Vidual Nuclides .		16. KAGE ACTIVITY MCI	LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
US DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-S	Sr-90	1.6206E+00	4.3800E-02	NA	545. LBS; 7.35 FT3	045
US DOT Exempt, Non-Regulated Material	NA:	NA .	Solid /NA	C-14	H-3	Sr-90	3,2375E-01	8.7500E-03	NA.	145. LBS; 7.35 FT3	046
US DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	3.2375E-01	8.7500E-03	NA	145. LBS; 7.35 F13	047
US DOT Exempt, Non-Regulated Material	. NA	NA	Solid /NA	C-14	Н-3	Sr-90	3,2375E-01	8.7500E-03	NA NA	145. LBS; 7.35 FT3	048
US DOT Exempt, Non-Regulated Material	NA	NA	Solid /NA	C-14	н-3	Sr-80	3,23756-01	8.7500E-03	NA	145. LBS; 7.35 F13	049
US DOT Exempt, Non-Regulated Material	NA NA	NA	Solid /NA	C-14	H-3	Sr-90	3.2375E-01	8,7500E-03	NA	145. LBS; 7.35 FT3	050
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STON GANA (KILOR)											

FORM 540A (10-08)

FORM 541 2. MANIFEST NUMBER Envirocare of Utah, Inc. AL NUCLEAR MATERIAL (grams) STALBAN-4032-01-001 PACKAGESI NET WASTE NET WASTE DISPOSAL VOLUME WEIGHT U-233 11,023 Pu TOTAL UNIFORM LOW-LEVEL RADIOACTIVE S. PAGE 1 OF 12 PAGE(S) 5080.3 **WASTE MANIFEST** 50 NP NP NP NP 4. SHIPPER NAME 387.50 Pon 5.60 U.S. Army Corps Of Engineers **CONTAINER AND WASTE DESCRIPTION** WIY SOURCE ALL NUCLIDES TRITIUM C-14 1-129 Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste 3.6284E+01 8.8386E+00 1.8051 E+81 SHIPMENT ID NUMBER MBq NP. 2.3888E-01 STALBAN-4032-01-001 9.80855-01 NP NP mCI (tons) NA EACH WASTE TYPE IN CONTAINE 14. CHEMICAL DESCRIPTION DISPOSAL CONTAINER DESC PHYSICAL DESCRIPTION 15. RADIOLOGICAL DESCRIPTION CLASSIFI CATION AS-Class A Stable AU-Class A Unstable B. WASTE SLIFFACE 12. APPROXIMATE 119. CONTAINER CONTAMINATION WASTE ENDIVIDUAL PADIONUCLIDES AND ACTIVITY (MEG) AND SURFACE SOLIDIFICATION WEIGHT AND WARTE VOLUME(S) IN CONTAINER (mS) (F13) IDENTIFICATION CONTAINER VOLUME OR STABILIZATION CHEMICAL FORM CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY
AND RADIONUCLIDE PERCENT CONTAINER RADIATION DESCRIPTOR NUMBER / DESCRIPTION (See Note 1 & CHELATING AGENT CHELATING LEVEL (See Note 2 GENERATOR ID NUMBER(S) B-Class B C-Class C & Note 2A) (See Note 5) AGENT mSythr_ (F>0.1% ALPHA RADIONUCLIDES 9.60000E+01 4.70000E+01 5.00000E+01 cocon/br MBq 3.2227E-01 8.7100E-03 C-14 AS 001/1 89,29-H NONEMP NA H-3 Sr-90 1.5762E-0 1.6798E-0 4.2800E-03 4.5400E-03 0.21 111.15 48.0000P-05 3.3400%-0 0.20 1.7510E-02 6.4787E-01 <8.000E-03 2,0000E+02 7.35 Subtotal 7.35 0.12 NP Total 6.4787E-01 1.7510E-02 002/1 9.60000E+01 4.70000E+01 5.00000E+01 1.6095E-01 7.8810E-02 8.3990E-02 4.3500E-03 49 4 39-H NONE/NE 2.1300E-03 2.2700E-03 H-3 Sr-90 0.21 66.77 <8.0000E-06 3.34006-06 0.20 ш 7.15 -d9.0000E-03 Subtotal 3,2375E-01 8.7500E-03 0.07 2.0000E+02 7.35 8.7500E-03 Total 3.2375E-01 4.3500E-03 2.1300E-03 2.2700E-03 003/1 NONE/NP C-14 H-3 Sr-90 9.60000E+01 1.6095E-01 AS, 39-11 NA 0.21 65.7 **∠8.00001∺**05 5.5400F-06 4.70000E+01 5.00000E+01 7.8810E-02 8.3990E-02 0.20 NP Subtotal 3.2375E-01 8.7500E-03 7.15 0.07 48,000 F-05 2 0000E+03 7.35 3.2375E-01 8.7500E-03 Total NOTE 1: Container Description Codes, For containers/ Note 1A: Bulk Packaging Description Codes NOTE 2: Wante Descriptor Codes, (Choose up to three which predominate by volume.) Note 2A: Specific Weste Descriptio Note 3: Solidification and Stabilization Media Codes. (Choose up to three which predominate by volume.) For media meeting disposal site structural stability requirements, the numerical code must be followed by "S" and the medie vector and brand name must also be identified in firm 13. Code 100±8/GME REGUIRED

waste requiring disposal in approved structural over-packs the numerical code must be followed by "-OP."

- Wooden Box or Crate 9. Dendoerelizer
- 10. Gas Cylinder 11. Bulk, Unpackaged Waste 12. Unpackaged Components Metal Box Plasto Drum or Pati Metal Drum or Pati
- i. Nestal Tank or Liner 18. High integrity Container I. Concrete Tank or Liner 19. Other. Describe in Nam 6, I. Polyethene Tank or Liner or additional page.

3. Fibergiass Tank or Liner

se one code as may be applicable.)

- A Gondola
- C End-dump
- D Roll-off E Seevan

- 29. Demolition Rubble
- 20. Charcost
- 30. Cation Ion-exchange Media 31. Anion Ion-exchange Media 32. Mixed Bed (on-exchange Media 22. Soli 23. Gas 33. Contaminated Equipment 34. Organic Liquid (except oil) 24. Oil 25. Anusous Liquid
- 25. Filter Media 35. Giassware or Labware 27. Mechanical Filter 28. EPA or State 37. Paint or Plating Hazardova
- 38. Evaporator Bottoms/Sludges/
- 39. Compactible Trash 40. Noncompactible Trash 41. Animal Carcast
 42. Biological Material (except
- animal carcase) 43. Activated Material 59. Other, Describe in Item 11. or additional page

Air Filtration Filters

ose all applicable codes.)

- Solid

Solidification 90. Coment 94. Vinvi Ester Styrene 91. Concrete 99. Other. Describe (encapsulation) 92, Bitumen in item 13, or edditional page

100, None Required.

93. Vinyl Chloride

	····							· ·			·					
FORM 541A	•		Ū	NIFORM			RADIOACTIV	VE				Envirocare of Uta	ah, Inc. 2.	MANIFEST NU	MBER 4032-01-001	·
					WAST	E MANII	FEST		•	•			<u> </u>			
		NTAINER DESC	Alloyards -	CONTAINE	AND WAS	TE DESCRI	РТІОМ (СОМТІМИ	ATION)					3.	PAGE 2 OF 1	2 PAGE(S)	IB.WASTE
	T	1						PHYSICAL DESCRIP	WASTE DESCRIPTION	14. CHEMICAL DE	SCRIPTION_	ANTAINER 15.	RADIOLOGICAL	DESCRIPTION		CLASSIFT- CATION
CONTAINER EDENTIFICATION NAMEER/ GENERATOR O HUMBER(S)	CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (ms)	B. WASTE AND CONTAINER WEIGHT (tq) (100)	8. SURFACE RADIATION LEVEL <u>MSV/M</u>	10. SUFF CONTAM MBoth dpm/10	INATION 20 cm2 BETA-	WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (F13)	13. SOLIDIFICATION. OR STABILIZATION MEDIA (See Note 3)	CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT F>0.1%	CONTAINER	TOTAL; OR CONT AND RADIONUCL	AND ACTIVITY (ME FANCE TOTAL ACT IDE PERCENT		AS-Cines A Stable AU-Class / Unstable B-Class B C-Class C
004/1	4		(100)	trienytr.		GAMMA	39-H	 	NA	NONE/NP		C-14	pCl/gm 9.60000E+01	1.6095E-01	4.9500E-03	A\$
•	{·	0.21	65.77	<8.0000E-05	NP.	3.3400E-08		0.20			\$0p	H-3 Sr-80	4.70000E+01 5.00000E+01	7,8810E-02 8,3990E-02	2.1300E-03 2.2700E-03	
		7.35	0.07	<6.0006-03	NP	2,000015+02		7.35				Subtotal		3.2375E-01	8.7500E-03	
									-	,		Total		3.2375E-01	8.7500E-03	
	'										}					
005/1	1.	<u> </u>					39-H	 	NA	NONE/NP		C-14 H-3	9.60000E+0 4.70000E+0 5.00000E+0	1.6095E-01 7.8810E-02 8.3990E-02	4.3500E-03	AS
		0.21	65.77	<8.000008-078	NP	3.3400E-06		0.20		,	NP	Sr-90	5.00000E+0	·		
·		7.25	0.07	<8.000E-03	NP	2.00005+02		7.35			<u> </u>	Subtotal		3.2375E-01	8.7500E-03	
	Ì		.	l	Į.		`	Į.				Total		3.2375E-01	8.7500E-03	
									ļ <i>.</i>						·	ļ ·
006/1	4	0,21	65.77	<8.0000£-05	NP	3.3400E-08	39-H	0.20	NA .	NONEMP	l	C-14 H-3 Sr-90	9.60000E+0	1.6095E-01 7.8810E-02 8.3990E-02	4.3500E-03 2.1300E-03	AS .
	1		ļ		<u> </u>		1		1		NP		4.70000E+0 5.00000E+0	1		٠į
	ļ.	7.35	6.07	<8.000E-03	KP	2.000GE+03		7.35		ļ	<u> </u>	Subtotal		3.2375E-01	8.7500E-03	<u>'</u>
	l]		Í			Total		9.2375E-01	8,7500E-03	
			1	\	{											
00771	•	0.21	111.13	<8.0000E-05	NP	3.3400E-06	39,29-H	0.20	NA	NONE/NP		C-14 H-3 Sr-90	9.60000E+0 4.70000E+0 5.00000E+0	3.2227E-01 1.5762E-01 1.6798E-01	8.7100E-03 4.2600E-03 4.5400E-03	AS
		7.35	0.12	<6.000 6 -03	NP	2.0000E+02	1	7.35	†	ļ	HEP.	Sr-90 Subtotal	5.00000E+0	1 1.6798E-01 6.4787E-01	4.5400E-03	.1
	 			103005-03		2,000,000	 	1.30	ļ ———]
	1		<u> </u>								i	Total		6.4787E-01	1.7510E-02	1
		<u> </u>			<u></u>	<u> </u>								Ĭ		l
008/1	1	0.21	111.13	<8.0000£-05	MP	3.3400E-06	39,29-H	0.20	NA .	NONEMP	NP	C-14 H-3 Sr-90	9.60000E+0 4.70000E+0 5.00000E+0	1 1.5762E-01	8.7100E-03 4.2600E-03 4.5400E-03	31
		7.35	0.12	<8.000E-03	NP	2.00005+02] .	. 7.35	1)	"	Subtotal	U.SUUUVA:TU	6.4787E-01		.[
FORM 641A (10-96)					<u> </u>	L										

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc. 2. MANIFEST NUM

2. MANIFEST NUMBER STALBAN-4032-01-001

3. PAGE 3 OF 12 PAGE(S)

	<u> </u>			CONTAINE	RAND WAS	TE DESCRI	PTION (CONTINU	ATION:				<u> </u>	3.	PAGE 3 OF 12	• • •	
	UISPOSAL CO	TAINER DESC	APTION .					PHYSICAL DESCRI	WASTE DESCRIPTION	N FOR EACH WAST	E TYPE IN C	ONTAINER 10	PADIOLOGICAL	DESCRIPTION		(B.WASTE CLASSIFI-
E. CONTAINER DENTIFICATION NUMBER! GENERATOR ID NUMBER!(S)	6. CONTAINER DESCRIPTION (See Note 1 & Note 1 A)	7. VOLUME 一圖一	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL mSubr		INATION		12. APPROXIMATE WASTE	SOLDIFICATION OR STABILIZATION		WEIGHT	INDIVIDUAL CONTAINER	RADIONUCLIDES A TOTAL: OR CONTA AND RADIONUCLI	ND ACTIVITY (MB WHER TOTAL ACT	g) AND IVITY	CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
10 10,000		(,2)	(kg) (kg)	mSvity mremitic	ALPHA	GAHMA						RADIONUCLIDES	pCl/gm	MBq	anCl	
•	}				<u> </u>							Total		6.4787E-01	1.7510E-02	
Ī							;					Ì		.]		60.50
009/1	•	0.21	111.19	<0.0000E-05	NP	3.3400 <u>E-0</u> 6	39,29-H	0.20	NA	NONEMP	ИÞ	C-14 H-3 Sr-90	9.60000E+01 4.70000E+01 5.00000E+01	3.2227E-01 1.5762E-01 1.6798E-01	8.7100E-03 4.2600E-03 4.5400E-03	AS
		7,35	0.12	<8.000E-03	NP	2.0000E+02		7.35				Subtotal		6.4787E-01	1.7510E-02	l
										· · · · · · · · · · · · · · · · · · ·		Total		6.4787E-01	1.7510E-02	
											1				'	
810/1	•	0.21	111.13	≪8.0000€-05	NP	3.3400E-06	39,2941	0.20	NA	NOME/NP	NP	C-14 H-3 Sr-90	9.60000E+01 4.70000E+01 5.00000E+01	3.2227E-01 1.5762E-01 1.6798E-01	8.7100E-03 4.2600E-03 4.5400E-03	AS
		7,35	0.12	<8.000E-03	NP	2.00008+02		7.35				Subtotal		6.4787E-01	1.7510E-02	
												Total		6.4787E-01	1.7510E-02	
				[]		ĺ		Ì	l	Ì.		1	•		
611/I	•	0.21	111.13	<4.0000€-05	HD	3.3400E-06	39,29-11	0.26	NA	NONEMP	NP	C-14 H-3 Sr-90	9.60000E+01 4.70000E+01 5.00000E+01	3.2227E-01 1.5762E-01 1.6798E-01	8.7100E-03 4.2600E-03 4.5400E-03	AS
		7.35	0.12	<8.000E-03	КP	2.0000E+02		7.35				Subtotal	<u> </u>	6.4787E-01	1.7510E-02	374
												Total		6.4787E-01	1.7510E-02	
			·				[.	{		<u> </u>		(
012/1	•	0.21	111.13	<1.0000E-05	MP	\$.3400E-06	39,29 H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	9.60000E+01 4.70000E+01 5.00000E+01	3.2227E-01 1.5762E-01 1.6798E-01	8.7100E-03 4.2600E-03 4.5400E-03	AS
		7.85	0.12	<8.000E-03	NP	2.00005+02		7.35				Subtotal		6.4787E-01		· E
												Total		6.4787E-01	1.7510E-02	
									<u> </u>							<u>L</u>
FORM \$41A (10-96)																

FORM \$41A (10-96)

FORM 541A

FORM 541A Envirocare of Ulah, Inc. 2. MANIFEST NUMBER **UNIFORM LOW-LEVEL RADIOACTIVE** STALBAN-4032-01-001 **WASTE MANIFEST** 3. PAGE 4 OF 12 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) I B.WASTE CLASSIFI-CATION AS-Class A Stable ALI-Class A Unstable B-Class B C-Class C SOLIDIFICATION
SOLIDIFICATION
CHEMICAL FORM
ATEMA
CHELATING AGENT SURFACE 8. WASTE INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT AND CONTAINER WEIGHT CONTAINER IDENTIFICATION WASTE DESCRIPTOR WASTE VOLUME(S) IN WEIGHT SURFACE CONTAMINATION CONTAINER VOLUME RADIATION MBa/100 cm2 don/100 cm2 NUMBER / GENERATOR ID NUMBER(S) CONTAINER (ms) (FTs) CHELATIN (See Note 2 (See Note 1 & Note 1A) (See Note 3) AGENT IF>0.1% INSVAN. ALPHA GAMMA 3.2227E-01 1.5762E-01 1.6798E-01 8.7100E-03 4.2600E-03 4.5400E-03 NONE/NE 39,29-H 013/1 0.31 111.13 <8.0000E-05 3.340gE-08 0.20 H-3 Sr-90 HР 6.4787E-01 Subtotal 1.7510E-02 7.98 0.12 <6.000E-03 7,35 6.4787E-01 1.7510E-02 Total 9.60000E+01 4.70000E+01 5.00000E+01 3.2227E-01 1.5762E-01 1.6798E-01 014/1 39,29-11 HOKENP 4.2600E-03 4.5400E-03 <8.0000E-05 0.21 111.13 3.3400E-06 0.20 6.4787E-01 1.7510E-02 Subtotal 7.35 7,35 <8.000E-03 2.00005+02 0.12 1.7510E-02 Total 8.4787E-01 3.2227E-01 1.5762E-01 1.6798E-01 8.7100E-03 A9 4.2600E-03 4.5400E-03 NONEMP C-14 H-3 Sr-90 9.60000E+01 015/1 39,29-H 0.21 <8.0000E-05 3.3400E-08 0.20 211.13 NP 1.7510E-02 6.4787E-01 Subtotal 7,35 0.12 <8.000E-03 2,0000E+02 7.35 1.7510E-02 6.4787E-01 Total 8.7100E-03 AS 4.2600E-03 4.5400E-03 C-14 H-3 Sr-90 3.2227E-01 016/1 39,29-H HONEAUP <8.0000E-05 3.3400E-08 0.20 1.5762E-01 1.6798E-01 0.21 111.18 1.7510E-02 Subtotal 6.4787E-01 7,55 2.0000E+02 7.35 6.12 6.4787E-01 1.7510E-02 Total 6.7100E-03 As 4.2600E-03 4.5400E-03 **NONE/NP** 3.2227E-01 MA 017/1 39,29-H H-3 Sr-90 1.5762E-01 1.6798E-01 0.21 111 13 -8.0000F-05 MP 3.34005.06 0.20 6.4787E-01 1.7510E-02 Subtotal 7.35 7.35

UNIFORM LOW-LEVEL RADIOACTIVE STALBAN-4032-01-001 **WASTE MANIFEST** 3. PAGE 5 OF 12 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER
PHYSICAL DESCRIPTION 14, CHEMICAL DESCRIPTION DEPOSAL CONTAINENDESCRIPTION CLASSIFI-CATION AS-Class A Stable AU-Class A 15. RADIOLOGICAL DESCRIPTION 12. APPROXIMATE 18. 8. WASTE SURFACE CONTAMINATION 9. SURFACE WASTE
VOLLAME(S) IN
CONTAINER
(ms)
(F18) INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT CONTAINER WASTE SOLIDIFICATION EDENTIFICATION NUMBER / GENERATOR ID NUMBER(S) CONTAINER VOLUME OR STABILIZATION CHEMICAL FORM %
MEDIA CHELATING AGENTICHELATING CONTAINER RADIATION LEVEL MBn/100 cm2 DESCRIPTOR DESCRIPTION Unstable B-Ctass B C-Ctass C (See Note 1 & Note 1A) & Note 2A) (See Note 3) AGENT ALPHA RADIONUCLIDES pCV/g/m 6.4787E-01 Total 1.7510E-02 8.0660E-01 3.9590E-01 4.1810E-01 2.1800E-02 1.0700E-02 1.1300E-02 C-14 H-3 Sr-90 9.60000E+01 4.70000E+01 5.00000E+01 018/1 39,29,40-HL NONE/NP AS 0.21 247.21 <2.5000E-04 3.3400E-06 0.20 NP 1.6206E+00 4.3800E-02 Subtotal 7.35 2.0000E+00 7.35 0.27 <2.500E-02 4.3800E-02 1.6206E+00 Total 9.60000E+01 4.70000E+01 5.00000E+01 8.0660E-01 3.9590E-01 4.1810E-01 2.1800E-02 1.0700E-02 1.1300E-02 C-14 H-3 Sr-90 018/1 39,29,40-HL NONE/NP 0.21 247.21 <#.0000E-05 3.3000F-0 0.20 1.6206E+00 4.3800E-02 Subtotal 7.35 0.27 <8.000E-03 2.0000E+02 7.35 Total 1.6206E+00 4.3800E-02 020/1 C-14 H-3 Sr-90 3.2227E-01 1.5762E-01 1.6798E-01 8.7100E-03 4.2600E-03 4.5400E-03 NONE/NP 39,29-H NA 0.21 111,13 <8.0000E-05 3.3400E-08 0.20 NP 7.35 2.0000E+02 7.35 Subtotal 6.4787E-01 1.7510E-02 0.12 <8.000H-03 Total 6.4787E-01 1.7510E-02

6.20

7.35

39,29 H

3.3400E-06

2.0000E+02

NONEMP

C-14 H-3 Sr-50

Subtotal

Total ---

Envirocare of Utah, Inc.

2. MANIFEST NUMBER

8.7100E-03 AS 4.2600E-03 4.5400E-03

1.7510E-02

1.7510E-02

9.60000E+01 4.70000E+01 5.00000E+01

3.2227E-01 1.5762E-01 1.6798E-01

6.4787E-01

6.4787E-01

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6.21

7.15

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0.12

<8.0000E-05

<\$.000E-03

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FORM 541A

FORM \$41A UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

Envirocare of Utah, Inc.

2. MANIFEST NUMBER STALBAN-4032-01-001

3. PAGE 6 OF 12 PAGE(S)

	• .		•	CONTAINE		te neccoi	PTION (CONTINU	ATTONIA		•		·	3. PAGE 6 OF 12	PAGE(S)
	DISPOSAL CON	TAINER DESC	REPTION	LUNIAINE	ANU WAS	IE DESLE	SIGNIGATIAN		WASTE DESCRIPTION	IN FOR EACH WAST	ETYPEINC	ONTAINER		(6.WASY CLASSIF
S. CONTAINER IDENTIFICATION MUMBER! GENERATIOR ID NUMBER(S)	E CONTAINER DESCRIPTION (See Note 1 & Note 1 A)	7. VOLUME (nS) (f(3)	8. WASTE AND CONTAINER WEIGHT	9. SURFACE RADIATION LEVEL	10. SURF CONTAM MBofti dpm/10	INATION Or one	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRI 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (MS) (FTS)	13; SOLIDIFICATION OR STABILIZATION		WEIGHT	MOIDAL RADION	IOLOGICAL DESCRIPTION NUCLIDES AND ACTIVITY (MBA: OR CONTAINER TOTAL ACTI ADIONUCLIDE PERCENT	CATION AS-Class Stable
ID WOMBER(8)	1004 170	(#3)	(kg)	m\$vAr membr	ALPHA	GAMMA		(5.15)		<u> 1 – – – – </u>	1120.1%	RADIONUCLIDES p	Cl/gm MBq	mci
022/1		0.21	111,13	<4.0000E-05	NP	3.3400E-08	39,29-H	0.20	RA .	NONE/NP	NР	C-14 H-3 Sr-90 5.000	000E+01 1.5762E-01 000E+01 1.6798E-01	8.7100E-03 As 4.2600E-03 4.5400E-03
		7.35	· 0,12	49.000E-03	NP	2.0000E+02	ľ	7.35		}	<u> </u>	Subtotal	6.4787E-01	1.7510E-02
							·					Total	6.4787E-01	1,7510E-02
								į.]			ļ
023/1	4	0.21	156.49	<8.0000E-05	KР	3.5400E-08	39,29,40-H	0.20	NA .	NONE/NP	NP	C-14 9.60 H-3 4.70 Sr-90 5.00	000E+01 4.8470E-01 000E+01 2.3643E-01 000E+01 2.5160E-01	1.3100E-02 As 6.3900E-03 6.8000E-03
		7.45	0.17	<8.000E-03	, KP	2.0000E+02	1	7.35	1			Subtotal	9.7273E-01	2.6290E-02
												Total	9.7273E-01	2.6290E-02
			ł			ļ	j	ļ		ł	1		i i	
024/1	4	0.51	111.13	<8.0000E-05	цÞ	3.3400E-06	39,2 9 H	0.20	NA	NONE/NP	КP	C-14 9.60 H-3 4.70 Sr-90 5.00	0000E+01 3.2227E-01 0000E+01 1.5762E-01 000E+01 1.6798E-01	8.7100E-03 AS 4.2600E-03 4.5400E-03
		7.35	0,12	<6.000E-03	NP	2.0000E+02		7.35	ļ	Į i	ļ	Subtotal	6.4787E-01	1.7510E-02
												Total	6.4787E-01	1.7510E-02
		ł		ļ		}.		ļ		l	j	j		
025/1	4	0.21	111.13	<8.0000E-05	МР	3.3400E-06	39,29-11	0.20	NA NA	NONEMP	NP.	C-14 9.60 H-3 4.70 Sr-90 5.00	0000E+01 3.2227E-01 0000E+01 1.5762E-01 0000E+01 1.6798E-01	8.7100E-03 AS 4.2600E-03 4.5400E-03
		7.35	. 0.12	<8.000E-03	MP	2.0000E+02		7.35	ĺ		ŀ	Subtotal	6.4787E-01	
												Total	6.4787E-01	1.7510E-02
							} .			}	}	1		
025/1		6.21	111.73	-<8.0000€-05	· ·- NP-	3:3400E-06	39,29-11	0.20	HA	NONEMP	NP	C-14 9.60 H-3: 4.70 Sr-90 5.00	0000E+01 3.2227E-01 2000E+01 1:5762E-01 2000E+01 1.6798E-01	6.7100E-03 AS -4.2600E-03 4.5400E-03
·		7.25	6.12	<8.000€-03	NP	2.0000E+02		7.35	<u> </u>			Subtotel	6.4787E-01	
ECRN \$414 (10.06)														

FORM 541A Envirocere of Utah, Inc. 2. MANIFEST NUMBER UNIFORM LOW-LEVEL RADIOACTIVE STALBAN-4032-01-001 **WASTE MANIFEST** 3. PAGE 7 OF 12 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) 18.WASTE CLASSIFI-CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C PHYSICAL DESCRIPTION WASTE SURFACE SOLIDIFICATION CHEMICAL FORM %

OR STABILIZATION CHEMICAL FORM %

WELL

WELL

AGENT WASTE
VOLIME(S) IN
CONTAINER
(ms) CONTAINER AND CONTAINER WEIGHT WASTE REDMOUAL RADIONUCLIDES AND ACTIVITY (MBd) AND CONTAINER TOTAL, OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT SURFACE CONTAMINATION IDENTIFICATION NUMBER / CONTAINER DESCRIPTION WHEE RADIATION DESCRIPTOR (See Note 2 MBa/100 cm2 dom/100 cm2 GENERATOR O NUMBER(S) (See Note 1 & AGENT mSvhr AJ PHA GAMMA RADIONUCLIDE 6.4787F-01 1.7510E-02 Total 9.60009E+01 4.70000E+01 5.00000E+01 8.7100E-03 4.2600E-03 4.5400E-03 027/1 3.2227E-01 C-14 H-3 Sr-90 39,29-H NONEAR 1.5762E-01 111.13 <8.0000E-05 1.3400E-06 0.20 NP 6.4787E-01 1.7510E-02 Subtotal 7.25 2,000008402 7.35 Total 6.4787E-01 1.7510E-02 3.2227E-01 1.5762E-01 1.6798E-01 028/1 C-14 H-3 Sr-90 NONEMP 0.21 111.13 -4 honors no 5.5400P-ne 0.20 Subtotal 6.4787E-01 1.7510E-02 <8.000E-03 2.0000F+02 7 55 Total 6.4787E-01 1.7510E-02 8.7100E-03 AS 4.2600E-03 4.5400E-03 9.60000E+01 4.70000E+01 5.00000E+01 3.2227E-01 1.5762E-01 1.6798E-01 029/1 NONEAD 39,29-H 0.21 3.3400E-08 211.13 <5.0000E-05 n 20 Subtotal 6.4787E-01 1.7510E-02 7.35 2.0000E+02 7.35 Total 8.4787F-01 1.7510E-02 030/1 C-14 H-3 Sr-90 3.2227E-01 1.5762E-01 1.6798E-01 39.29-H NONEMP 8.71 111.13 <8.0000E-05 3.3400E-06 6.20 6.4787E-01 7.35 0.12 <8.000E-03 2.0000E+02 7.35 Subtotal 1.7510E-02 Total 6.4787E-01 1.7510E-02

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FORM 541A			U	NIFORM			RADIOACTI	/E	·			Envirocare of Ula	h, Inc. 2	MANIFEST NU	JMBER 4032-01-001	
					WAST	E MANII	FEST									
	DISPOSAL CO			CONTAINE	R AND WAS	TE DESCRI	PTION (CONTINU	ATION).					3	. PAGE 8 OF 12	2 PAGE(S)	
	T	TAINEH DESC	HIPTICIN					PHYSICAL DESCRI		N FOR EACH WAST	E TYPE IN C		RADIOLOGICA	, DESCRIPTION		CLASSIFI-
B. CONTAINER IDENTIFICATION NUMBER/ GENERATOR ID NUMBER(S)	G. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (ms) (Rs)	8. WASTE AND CONTAINER WEIGHT (tg)	8. SURFACE PADIATION LEVEL mSwhr	10. SURF CONTAN MBO/1 dpm/10	INATION 00 cm2 00 cm2 BETA-	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(5) IN CONTAINER (ms) (FT3)	SOLIDIFICATION OR STABILIZATION	CHEMICAL FORW CHELATING AGENT	WEIGHT % CHELATING AGENT IF>0.1%	CONTAINER T	OTAL; OR CON ND RADIONUCI	AND ACTIVITY (NE TAINER TOTAL ACT LIDE PERCENT	NVITY	CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
031/1	1		(fori)	manning	- ADIA	GAMMA	39,29-H		NA .	NONE/NP :		FADIONUCLIDES C-14	pCVgm 9.60000E+0	MRq 1 3.2227E-01	8.7100E-03	
· ·		0.21	111.13	<8.0000E-05	NP	3.3400E-06		0.20		,,,,,,,,,	NP	H-3 (4	4.70000E+0 5.00000E+0	1 1.5762E-01	4.2600E-03 4.5400E-03	
		7.35	0.12	<8.0006-03	MP	2.0000E+02	٠.	7.95	· .			Subtotal .		6.4787E-01	1.7510E-02	
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							,]			,		[1
032/1	4						39,29-11		NA	NONE/NP		C-14	9.60000E+0	3.2227E-01 1.5762E-01 1.6798E-01	8.7100E-03	AS
	}	0.21	111.13		NP	5.3400E-05	1	0.20	,		NP		4.70000E+0 5.00000E+0		4.2600E-03 4.5400E-03	-1
·		7.35	0.12	<8.000E-03	KP	2.0000E+02		7.35			<u> </u>	Subtotal		6.4787E-01	1.7510E-02	
	•	·								ł	1	Total		6,4787E-01	1.7510E-02	4
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				*8.000E-03	, Ar	2.0000EHI2	<u> </u>	7.35	 	}	 	Suddia		6.4787E-UI		<u>-</u>
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094/1	4	0.21	111.19	<0.0000E-05	MP	3.3400E-06	\$9,29-H	0.20	NA	HONE/NP		C-14 H-3 Sr- 9 0	9.60000E+0 4.70000E+0 5.00000E+0	3.2227E-01 1 1.5762E-01	4.2800E-03	31
	ļ	7.25	0.12	<8.000E-03	NP	2.0000E+02	İ	7.35	1		NP	Sr-90 Subtotal	5.00000E+0	1.6798E-01	4.5400E-03	-1
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<u> </u>		<u> </u>						·	·]		
C35/1	*	13.0	111.13	<8.0000E-05	NP	3.3400E-06	39,29-H	5.20	NA .	NONEMP	NP	C-14 H-3 Sr-90	9.60000E+0 4.70000E+0 5.00000E+0	3.2227E-01 11 1.5762E-01 1 1.6798E-01	8.7100E-0 4.2600E-0 4.5400E-0	3 AS
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	DISPOSAL CON	TAUÚER NESC	IIPT//W	CONTAINE	AND WAS	TE DESCRI	<u>БДОИ (СОИДИП</u>	ATION)	WASTE DESCRIPTION	Desales established	e waren e	Winnest .	<u>.</u>	FAGE 9 OF 12	ZTAGE(O)	I WARYE
								PHYSICAL DESCRU	TION	14. CHEMICAL DE	CRIPTION	15	, FADIOLOGICAL	DESCRIPTION		IE.WASTE CLASSIFI-
8. CONTAINER DENTIFICATION NUMBER / GENERATOR ID NUMBER(8)	CONTAINER DESCRIPTION (See Note 1 & Note 1 A)	7. VOLUME:	8. WASTE AND CONTAINER WEIGHT	9, SURFACE RADIATION LEVEL mSwhr	10. SUR! CONTAN MBo/1 dpm/11	INATION 00 cm2	WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (FT3)	SOLIDIFICATION OR STABILIZATION	CHEMICAL FORM CHELATING AGENT	WEIGHT % CHELATING AGENT IF-Q 1%	CONTAINER	RADIONUCLIDES (TOTAL: OR CONT AND RADIONUCLI	ANER TOTAL ACT	TIVNY	CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
			(ton)	mmmhr_	ACTIA	GAMMA						RADIONUCLIDES	pCl/gm	MBq	mCl	
						-						Total		6.4787E-01	1.7510E-02	
934/1	4	0.27	111,15	<8.0000E-05	ЫP	3.3400E-06	89,29-H	0.20	NA /	Nonemp	NP	C-14 H-3 Sr-90	9.60000E+01 4.70000E+01 5.00000E+01	3.2227E-01 1.5762E-01 1.6798E-01	8.7100E-03 4.2600E-03 4.5400E-03	AS
		7.35	0.12	<5.000E-03	NEP	2.0000E+02		7.35				Subtotal		6.4787E-01	1.7510E-02	
					 		·	 		,		Total		6.4787E-01		
657/1	4	0.21	191,19	<0.0000E-05	NP	3.3406E-06	39,29-11	0.20	NA	NONEMP	NP	C-14 H-3 Sr-90	9.60000E+01 4.70000E+01 5.00000E+01	3.2227E-01 1.5762E-01 1.6798E-01	8.7100E-03 4.2600E-03 4.5400E-03	AS
		7.35	0.12	<8.000E-03	· NP	2.00005+02		7.35				Subtotal		6.4787E-01		
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028/1	4	8.21	247.21	<8.0000E-05	NP	3.240(E-06	39,29,40-H	0.20	NA	NONEMP	NP	C-14 H-3 Sr-80	9.60000E+0 4.70000E+0 5.00000E+0	8.0660E-01 3.9590E-01 4.1810E-01	2.1800E-02 1.0700E-02 1.1300E-02	AS
		7.35	0.27	<8.000B-03	NP	2.0000E+02-		7.35				Subtotal		1.6206E+00	4.3800E-0	-1
					<u> </u>		1					Total		1.6206E+00	4.3800E-0	
639/1				<u> </u>			39,29,40-H		NA	NONE/NP	ļ	C-14	9 60000E+0	a neene na	2.1800E-0	AS
]	0.21	247.21	<8.0000€-05	NP	3.340012-08	30,23,60 H	0.20] ~~	NOME/NP	NP	H-3 Sr-90	9.60000E+0 4.70000E+0 5.00000E+0	8.0660E-01 1 9.9590E-01 1 4.1810E-01	1.1300E-0	
		7.25	0.27	<6.000E-03	NP.	2,0000E+02	ļ	7.95	 	 	 	Subtotal	 	1.6208E+00		
		ļ		}	ļ	ļ	4		4	1		Total		1.6206E+00	4.3800E-0	2
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1	in	4	0.21	65.77	<8.0000E-05	NP	3.3400E-06	39-H	0,20	NA NA	NONEMP		C-14 B.	60000E+0	01 1.6095E-01 01 7.8810E-02	4.3500E-03 2.1300E-03 2.2700E-03	A5
042/1 4 0.21 131.13 -0.0000E-05 NP 3.5400E-06 39,29-H 0.20 NA NONE/NP C-14 9.50000E-01 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1 1.5762E-1			7,35	6.07	<4.000€-03	NP	2.000025+02		7.95			HP.	Subtotal	.00000E+0	3.2375E-01	2.2700E-03 8.7500E-03	-1
7.35 0.12 <0.000E-03 NP 2.0000E-02 7.35 Subtotal 6.4787E-1 Total Total 6.4787E-1 O49/1 4 0.21 292.57 <0.0000E-05 NP 3.3400E-05 NP 3.3400E-06 7.35 NP 2.0000E-02 7.35 Subtotal 1.9425E-1								·	· · · · · · · · · · · · · · · · · · ·						8.2375E-01	8.7500E-03	
049/1 4 0.21 292.57 <0.0000E-05 NP 3.3400E-06 39.29.40-H 0.20 NA NONE/NP C-14 9.60000E+01 9.6570E-17.35 0.32 <0.000E-05 NP 2.0000E+02 7.35 Sr-30 Subtotal 1.9425E-H	211	4		 		NP	3.34008-06	39,29-H	0.20	NA NA	NONE/NP	NEP	H-3 Sr-90	60000E+4 70000E+4 00000E+	01 1.5762E-01 01 1.6798E-01		3
04971 4 0.21 292.57 <0.0000E-05 NP 3.3400E-06 0.20 NA NONE/NP C-14 H-3 4.70000E+01 4.7360E-05 5.00000E+01 5.00000E+01 5.00000E+01 1.9425E4			7.35	0.12	<8.000E-03	NP	2.0000E+02		7.35				20722270s		6.4787E-01 6.4787E-01	1.7510E-02	
9.21 292.57 <0.0000E-05 NP 3.3400E-06 0.20 H-3 5-30 4.7000E+01 4.7360E-10 5.0000E+01 5.0000E+01 5.0000E+01 5.0000E+01 1.9425E+1	w							30 20 40 M		l era	NONEND		C-14		01 0 65705.01	2 5100 5.00	2 AS
		-	-				 	33,20,7011		- T	i i i	NP	H-3 Sr-80	.70000E+4 .00000E+4	01 4.7360E-01 5.0320E-01	2.6100E-0; 1.2800E-0; 1.3600E-0; 5.2500E-0;	-I
										}					1.9425E+00	5.2500E-02	-
0447 4 39,29,40-14 NA NONEMP C-14 9,60600E+01 8,0660E-	er -							70 m (n)		WA	NOWENIN		0.14	cosmic.	01 9 00000 01	2.1800E-0	1
		•		 	 	NP		39,29,A0-H		- MA	HONEMP	NP	H-3 Sr-90	.70000E+4	01i 2.9590E-01i	1.0700E-02	2

FORM 641A UNIFORM LOW-LEVEL RADIOACTIVE Envirocare of Utah, Inc. 2. MANIFEST NUMBER STALBAN-4032-01-001 **WASTE MANIFEST** 3. PAGE 11 OF 12 PAGE(S) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) IEWASTE CLASSIFI-CATION AS-Class A Stablo AU-Class A WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER
PTION 14. CHEMICAL DESCRIPTION PHYSICAL DESCRIPTION 15. RADIOLOGICAL DESCRIPTION B. WASTE 10. SURFACE CONTAMINATION 9. SURFACE CONTAINER WASTE SOUDIFICATION CHEMICAL FORM WEIGHT CONTAINER MEDIA CHEMITOR AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT CHEMING AGENT AND WASTE DESCRIPTOR INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT IDENTIFICATION NUMBER/ GENERATOR ID NUMBER(S) CONTAINER VOLUME CONTAINER RADIATION MB0/100 cm2 dpm/100 cm2 (See Note 2 (See Note 1 & Note 1A) Unstable B-Class B C-Class C & Note ZA) AGENT m\$vhr ALPHA RADIONUCUDES Total 1.6206E+00 4.3800E-02 043/1 9.60000E+01 4.70000E+01 5.00000E+01 39,25,40-H C-14 H-3 Sr-90 8.0660E-01 3.9590E-01 4.1810E-01 2.1800E-02 1.0700E-02 1.1300E-02 RA HONEMP 0.21 247.21 3.3400E-08 0.20 7.35 6.27 <8.000E-03 2.0000E+02 Subtotal 7.36 1.6206E+00 4.3800E-02 Total 1.6206E+00 4.3800E-02 39-41 NONEMP C-14 H-3 Sr-90 9.60000E+01 4.70000E+01 5.00000E+01 1.6095E-01 7.8810E-02 8.3990E-02 4.9500E-03 2.1300E-03 2.2700E-03 0.21 69.77 <8.0000E-05 3.3400E-06 0.20 7,38 0.07 <8.000E-03 3.2375E-01 2.0000E+02 7.35 Subtotal 8.7500E-03 Total 8.7500E-03 3.2375E-01 C-14 H-3 Sr-90 9.60000E+01 4.70000E+01 5.00000E+01 1.6095E-01 7.8810E-02 8.3990E-02 4.3500E-03 AS 2.1300E-03 2.2700E-03 39-H NONE/NP 0.21 65.77 <8.0000E-05 3.3400E-06 0.20 7.35 0:07 <8.000E-03 Subtotal 2,0000E+02 7:35 3-2375E-01 8.7500E-03 Total 3.2375E-01 8.7500E-03 048/1 NONEMP 9.60000E+01 4.70000E+01 5.00000E+01 1.6095E-01 7.8810E-02 8.3990E-02 4.3500E-03 2.1300E-03 2.2700E-03 0.21 65,77 <8.0000E-05 NP 3.3406E-06 0.20 H-3 Sr-90 7.35 0.07 <8.000E-03 2.0000E+02 7.35 Subtotal 3.2375E-01 8.7500E-03 Total 3.2375E-01 8.7500E-03

2. MANIFEST NUMBER FORM 541A Envirocare of Utah, Inc. **UNIFORM LOW-LEVEL RADIOACTIVE** STALBAN-4032-01-001 **WASTE MANIFEST** 3. PAGE 12 OF 12 PAGE(\$) CONTAINER AND WASTE DESCRIPTION (CONTINUATION) 16.WASTE CLASSIFI-CATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C DISPOSAL CONTAINER DESCRIPTION WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINE FTON 14. CHEMICAL DESCRIPTION PHYSICAL DESCRIPTION 12. APPROXIMATE 13. 15, RADIOLOGICAL DESCRIPTION 8. WASTE AND CONTAINER WEIGHT 10. SURFACE
CONTAMINATION
MBo/100 cm2
dpm/100 cm2 INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL, OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT CONTAINER SURFACE RADIATION LEVEL WASTE WASTE SOLIDIFICATION WEIGHT IDENTIFICATION NUMBER/ GENERATOR ID NUMBER(8) CONTAINER DESCRIPTION (See Note 1 & Note 1A) VOLUME(S) IN CONTAINER (m3) (FT3) DESCRIPTOR (See Note 2 & Note 2A) OR STABILIZATION CHEMICAL FORM %
MEDIA CHELATING AGENT CHELATING
(See Note 3)
AGENT VOLUME AGENT IF>0.1% BETAmSwhr ALPHA 9.60000E+01 4.70000E+01 5.00000E+0 GAMMA NONEMP C-14 H-3 Sr-90 AS 39-H 0.21 <8.0000€-05 3.3400E-08 0.20 3.2375E-01 8.7500E-03 Subtotal 7.35 <6.000E-03 · NP 2.0000E+02 7.35 Total 3.2375E-01 8.7500E-03 1.6095E-01 7.8810E-02 8.3990E-02 C-14 H-3 Sr-90 9.60000E+01 4.70000E+01 5.00000E+01 050/1 NA NONEMP 0.21 <8.0000E-05 3.3400E-08 6.20 Subtotal 3.2375E-01 8.7500E-03 7.35 7.39 <8.000E-03 2.0000E+02 3.2375E-01 8.7500E-03 Total 3.6284E+01 9.8065E-01 Shipment Totals 10.50 387.50 6.60

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST ISOTOPES REPORT

For Manifest # STALBAN-4032-01-001 Envirocare of Utah, Inc.

Total Activity

isotope	(MBa)	(mCl)
C-14	1.8051E+01	4.87862-01
H-3	8.6386E+00	2.3889E-01
8r-90	9.3947E+00	2.5391E-01

AWASTESTORACETEG

ST. ALBANS VAECC BUILDING 90 DECONTAMINATION/DECOMMISSIONING QUEENS, NY

Date Stored	Drum #	Location Generated	Internal Smear Sample # dpm/100cm ² min max		External Radio Res dpm/100cm²	-	Contents
04-Oct-00	1	Counting Room	40	40	<200	<0.008	PPE, METAL
27-Sep-00	2	Counting Room	33	56_	<200	<0.008	PPE
27-Sep-00	3	Counting Room	18	49	<200	<0.008	PPE
27-Sep-00	4	Counting Room	73	91	<200	<0.008	PLASTIC, PPE
27-Sep-00	5	Counting Room	14	15	<200	<0.008	PPE
27-Sep-00	6	Counting Room	34	63 ·	<200	<0.008	PPE, PLASTIC
29-Sep-00	7	Counting Room	50	68	<200	<0.008	PPE, METAL, WOOD
29-Sep-00	8	Counting Room	33	50	<200	<0.008	PPE, WOOD, BULBS
29-Sep-00	9	Counting Room	51	141	<200	<0.008	PPE. RAGS, ELECTRICAL EQUIPMENT, METAL
29-Sep-00	10	Counting Room	25	121	<200	<0.008	PPE, METAL, WOOD
29-Sep-00	11	Counting Room	37	73	<200	<0.008	PPE, GLASS,WOOD
03-Oct-00	12	Counting Room	45	51	<200	<0.008	PPE, PLASTIC, WOOD
03-Oct-00	13	Counting Room	10	14	<200	<0.008	PPE, METAL TABLE TOPS
03-Oct-00	14	Counting Room	23	41	<200	<0.008	PPE, GLASS, METAL, FILTERS
03-Oct-00	15	Counting Room	53	60	<200	<0.008	PPE, METAL
03-Oct-00	16	Low Level	-1	3	<200	<0.008	PPE, METAL TABLE TOPS
04-Oct-00	17	Low Level	33	42	<200	<0.008	PPE, METAL
04-Oct-00	18	Low Level	n/a	271	<200	<0.025	PPE, CONCRETE, PLASTIC, TRANSITE (YELLOW DRUM)
04-Oct-00	19	Low Level	n/a	119	<200	<0.008	PPE, METAL, TRANSIT (YELLOW DRUM)
04-Oct-00	20	Low Level	-3_	8.0	<200	<0.008	METAL, GLASS
04-Oct-00	21	Low Level	4	8	<200	<0.008	METAL,GLASS
04-Oct-00	22	Low Level	26	58	<200	<0.008	PPE,METAL CABINETS,WOOD
11-Oct-00	23	Mens Room	-4	-3	<200	<0.008	PPE, MARBLE
05-Oct-00	24	Low Level	17	70	<200	<0.008	METAL, WOOD

Date Stored	Drum #	Location Generated		ear Sample # 100cm² max	External Radio Res dpm/100cm²	ological Survey	Contents
05-Oct-00	25	Low Level	-13	50	<200	<0.008	METAL CABINET DRAWERS, WOOD
05-Oct-00	26	Low Level	·15	21	<200	<0.008	METAL WOOD, GLASS
05-Oct-00	.27	Low Level	2	23	<200	<0.008	METAL,WOOD
05-Oct-00	28	Low Level	158	169	<200	<0.008	METAL, WOOD, GLASS, PPE
10-Oct-00	29	Low Level	527	3225	<200	<0.008	WOOD, METAL, PPE
10-Oct-00	30	Low Level	24	137	<200	<0.008	METAL TABLE
10-Oct-00	31	Low Level	n/a	27	<200	<0.008	METAL.
10-Oct-00	32	Low Level	148	249	<200	<0.008	METAL, SINK, WOOD
10-Oct-00	33	Low Level	n/a	19	<200	<0.008	METAL, TRASH,PPE
10-Oct-00	34	Low Level	15	446	<200	<0.008	SINK, CABINETS,BAGS,PPE
10-Oct-00	35	Low Level	9	25	<200	<0.008	METAL COUNTER, SHELVES, BAGS
10-Oct-00	36	Low Level	-5	28	<200	<0.008	METAL SHELVES, COUNTER TOP, PIPES
10-Oct-00	37	Low Level	54	. 81	<200	<0.008	METAL SHELVES, BLACKBOARD
The same	98	NUMBERNOTUS	ED)	WATER SE			ALT LESS
13-Oct-00	39	Mens Room	284	304	<200	<0.008	TILE, PPE
13-Oct-00	40	Mens Room	-7	22	<200	<0.008	PPE, TRASH, FLOOR DIRT
13-Oct-00	41	Mens Room	8	9	<200	<0.008	PPE
07-Oct-00	42	Mens Room	-8	11	<200	<0.008	METAL SHELVES, COUNTING FLOOR SWEEPINGS
07-Oct-00	43	Mens Room	-24	-7	<200	<0.008	CONCRETE, PPE
07-Oct-00	44	Mens Room	0.8	12	<200	<0.008	WOOD, CONCRETE, METAL, TILES
07-Oct-00	45	Mens Room	-5	5	<200	<0.008	CONCRETE, TILE, WOOD
07-Oct-00	46	Mens Room	-13	-12	<200	<0.008	PPE. TRASH
23-Oct-00	47	A-waste Corr.#45	n/a	4	<200	<0.008	RAD PLASTIC FROM CORRIDOR 45
23-Oct-00	48	A-waste Corr.#45	n/a	-9	<200	<0.008	RAD PLASTIC FROM CORRIDOR 45, TRASH
23-Oct-00	49	A-waste Corr.#45	n/a	- 5	<200	<0.008	RAD PLASTIC FROM CORRIDOR 45
23-Oct-00	50	A-waste Corr.#45	-13	5	<200	<0.008	RAD PLASTIC FROM CORRIDOR 45

Date Stored	Drum #	Location Generated	Internal Sme dpm/1 min	ear Sample # 00cm² max	External Radio Res dpm/100cm²	•	Contents
24-Oct-00	51	"A" Lab Area	-3	-11	<200	<0.008	ASBESTOS HOOD, TILE
24-Oct-00	52	"A" Lab Area	-2	1	<200	<0.008	ASBESTOS HOOD
24-Oct-00	53	"A" Lab Area	11	29	<200_	<0.008	ASBESTOS HOOD, GLASS, METAL, TOWELS FROM MASTIC
24-Oct-00	54	"A" Lab Area	-21	-34	<200	<0.008	PPE FROM "A"
24-Oct-00	55	"A" Lab Area	-10	-12	<200	<0.008	RAD WASTE FROM ASBESTOS REMOVAL
25-Oct-00	56	"A" Lab Area	11	14	<200	<0.008	PLASTIC, METAL COUNTER
25-Oct-00	57	"A" Lab Area	5	8	<200	<0.008	METAL PLATE
25-Oct-00	58	"A" Lab Area	5	13	<200	<0.008	RAD WASTE FROM ASBESTOS REMOVAL
25-Oct-00	59	"A" Lab Area	n/a	25	<200	<0.008	METAL, PLASTIC, ASBESTOS MATERIAL
25-Oct-00	60	High Level Lab	23	25	<200	<0.008	METAL, COPPER, PLASTIC
25-Oct-00	61	High Level Lab	8	8	<200	<0.008	METAL SINK, GLASS
25-Oct-00	62	High Level Lab	-3	2	<200	<0.008	METAL SINK, METAL CABINETS
25-Oct-00	63	High Level Lab	0.7	30	<200	<0.008	METAL SINK
25-Oct-00	64	High Level Lab	11	12	<200_	<0.008	METAL SINK, PPE
26-Oct-00	65	Hìgh Level Lab	9	46	<200	<0.008	TRASH, METAL SINK, PPE
26-Oct-00	66	High Level Lab	-23	0.5	<200	<0.008	METAL SINK, METAL FROM HOOD
26-Oct-00	67	High Level Lab	-5	10	<200_	<0.008	METAL SINK, METAL FROM HOOD
26-Oct-00	68	High Level Lab	-7	19	<200	<0.008	METAL SHELVES
26-Oct-00	69	High Level Lab	12	22	<200	<0.008	METAL CABINETS
26-Oct-00	70	High Level Lab	2	21	<200	<0.008	METAL CABINETS
26-Oct-00	.71	High Level Lab	-12	35	<200	<0.008	METAL CABINETS
26-Oct-00	72	High Level Lab	-16	5	<200	<0.008	METAL CABINETS
26-Oct-00	73	Isotope Room Walls	16	23	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
26-Oct-00	74	Isotope Room Walls	-7	-26	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
26-Oct-00	75	Isotope Room Walls	-7	0.5	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE

Date Stored	Drum#	Location Generated		ear Sample # 00cm ² max	External Radio Res dpm/100cm²		Contents
26-Oct-00	76	Isotope Room Walls	-21	9	<200_	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
26-Oct-00	77	Isotope Room Walls	-17	-21	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
26-Oct-00	78	Isotope Room Walls	0.5	20	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
27-Oct-00	79	Isotope Room Walls	-4	-18	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
27-Oct-00	_80	Isotope Room Walls	3	11	<200	<0.008	WOOD
27-Oct-00	81	Isotope Room Walls	8	16	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
27-Oct-00	82	Isotope Room Walls	4	25	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
27-Oct-00	83	Isotope Room Walls	-9	-22	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
27-Oct-00	84	Isotope Room Walls	-2	-3	<200	<0.008	WOOD
27-Oct-00	85	Isotope Room Walls	-5	-17	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
27-Oct-00	86	Isotope Room Walls	16	21	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
27-Oct-00	87	Isotope Room Walls	5	35	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
27-Oct-00	88	isotope Room Walls	-4	-0.2	<200	<0.008	PLASTIC, WOOD
31-Oct-00	89	High Level Lab	6	49	<200	<0.008	WOOD FROM WALLS
31-Oct-00	90	Isotope Room Walls	17	20	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
31-Oct-00	91	Isotope Room Walls	-7	-14	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
31-Oct-00	92	Isotope Room Walls	8	32	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
31-Oct-00	93	Isotope Room Walls	4	38	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
31-Oct-00	94	High Level Lab	-9	11	<200	<0.008	PPE
31-Oct-00	95	isotope Room Walls	-3	-10	<200	<0.008	ISOTOPE ROOM WALLS AND CONCRETE
31-Oct-00	96	High Level Lab	10	-27	<200	<0.008	WOOD FROM WALLS
01-Nov-00	97	High Level Lab	-15	-0.5	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	98	High Level Lab	-13	-18	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	99	High Level Lab	n/a	9	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	100	High Level Lab	-18	15	<200	<0.008	WOOD FROM WALLS & CEILINGS

Date Stored	Drum #	Location Generated	Internal Smear Sample # dpm/100cm² min max		External Radio Res dpm/100cm²	logical Survey ults mr/hr	Contents
01-Nov-00	101	High Level Lab	-17	-18	<200	<0.008	WOOD FROM CEILINGS & LIGHTS
01-Nov-00	102	High Level Lab	3	24	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	103	High Level Lab	1.4	43	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	104	High Level Lab	7	10	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	105	High Level Lab	11	21	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	106	High Level Lab	- 5	19	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	107	High Level Lab	-6	-25	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	108	High Level Lab	-6	13	<200	<0.008	WOOD FROM WALLS & CEILINGS
02-Nov-00	109	High Level Lab	-15	-34	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	110	High Level Lab	-4	12	<200	<0.008	WOOD FROM WALLS & CEILINGS
01-Nov-00	111	High Level Lab	-0.6	9	<200	<0.008	HOOD MATERIAL "A"
01-Nov-00	112	High Level Lab	10	16	<200	<0.008	LIGHTS FROM LAB CEILING
02-Nov-00	113	High Level Lab	19	25	<200	<0.008	WOOD FROM WALLS & CEILINGS
02-Nov-00	114	High Level Lab	22	39	<200	<0.008	METAL BURNER
02-Nov-00	115	High Level Lab	-11	22	<200	<0.008	WOOD FROM WALLS & CEILINGS, SAWDUST
02-Nov-00	116	High Level Lab	0.2	5	<200	<0.008	WOOD FROM WALLS & CEILINGS, SAWDUST, S.S.
02-Nov-00	117	High Level Lab	-5	21	<200	<0.008	WOOD FROM WALLS & CEILINGS
02-Nov-00	118	High Level Lab	-6	15	<200	<0.008	WOOD FROM WALLS & CEILINGS
02-Nov-00	119	High Level Lab	-4	3	<200	<0.008	WOOD FROM WALLS & CEILINGS
02-Nov-00	120	High Level Lab	-0.8	9	<200	<0.008	WOOD FROM WALLS & CEILINGS
02-Nov-00	121	High Level Lab	-5	18	<200	<0.008	WOOD FROM WALLS & CEILINGS, DUCT WORK
02-Nov-00	122	High Level Lab	-2	8	<200	<0.008	WOOD FROM WALLS & CEILINGS, DUCT WORK
02-Nov-00	123	High Level Lab	6	26	<200	<0.008	WOOD FROM WALLS & CEILINGS, DUCT WORK
02-Nov-00	124	High Level Lab	13	37	<200	<0.008	WOOD FROM WALLS & CEILINGS, DUCT WORK
02-Nov-00	125	High Level Lab	-32	22	<200	<0.008	VENTILATION SYSTEM, RAD PPE/WASTE

Date Stored	Drum #	Location Generated		ear Sample # 00cm ² max	External Radiol Resi	•	Contents
02-Nov-00	126	High Level Lab	-7	26	<200	<0.008	VENTILATION SYSTEM, PIPE
07-Nov-00	127	Counting Room	5	23	<200	<0.008	WOOD FROM WALLS & CEILINGS
02-Nov-00	128	High Level Lab	-6	4	<200	<0.008	PPE
02-Nov-00	129	High Level Lab	14	21	<200	<0.008	PIPE INSULATION "A"
03-Nov-00	130	High Level Lab	9	36	<200	<0.008	VENTILATION SYSTEM
03-Nov-00	131	High Level Lab	-3	13	<200	<0.008	VENTILATION SYSTEM, PIPE INS., FLOOR SWEEPING
03-Nov-00	132	High Level Lab	9	36	<200	<0.008	VENTILATION SYSTEM
03-Nov-00	133	High Level Lab	12	29	<200	<0.008	VENTILATION SYSTEM
07-Nov-00	. 134	Low Level	15	22	<200	<0.008	WOOD WALL / COPPER PIPE
07-Nov-00	135	Distalation Closet	15	22	<200	<0.008	METAL FITTING
07-Nov-00	136	Low Level	19	-29	<200	<0.008	WOOD FROM WALLS & CEILINGS
07-Nov-00	137	Low Level	-3	3	<200	<0.008	WOOD FROM WALLS & CEILINGS
07-Nov-00	138	Low Level	-4	22	<200	<0.008	WOOD FROM WALLS & CEILINGS
07-Nov-00	139	Low Level	109	178	<200	<0.008	WOOD AND METAL LIGHT FIXTURES
07-Nov-00	140	Low Level	77	128	<200	<0.008	WOOD FROM WALLS & CEILINGS
07-Nov-00	141	Counting Room	40	250	<200	<0.008	WOOD FROM WALLS & CEILINGS
07-Nov-00	142	Low Level	13	23	<200	<0.008	WOOD FROM WALLS & CEILINGS
07-Nov-00	143	Low Level	6	26	<200	<0.008	LIGHT FIXTURES
07-Nov-00	144	Counting Room	38	61	<200	<0.008	WOOD FROM WALLS & CEILINGS
07-Nov-00	145	Counting Room	-14	18	<200	<0.008	WOOD FROM WALLS & CEILINGS, METAL
09-Nov-00	146	Low Level	-3	48	<200	<0.008	WOOD WALLS, ELECTRICAL LINE
07-Nov-00	147	Counting Room	-7	21	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	148	Counting Room	-13	0.2	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	149	Counting Room	6	16	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	150	Low Level	4	10	<200	<0.008	WOOD FROM WALLS & CEILINGS

Date Stored	Drum #	Location Generated		ear Sample # 00cm ² max	External Radio Resi dpm/100cm²		Contents
09-Nov-00	151	Counting Room	61	70	<200	<0.008	WOOD FROM WALLS & CEILINGS, ELECTRICAL LINES
09-Nov-00	152	Low Level	-3	. 17	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	153	Low Level	-24	12	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	154	Counting Room	5	29	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	155	Low Level	-10	19	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	156	Low Level	12	14	<200	<0.008	WOOD FROM WALLS & CEILINGS
07-Nov-00	157	Low Level	-4	19	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	158	Counting Room	-3	-16	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	159	Counting Room	-27	21	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	160	Counting Room	-6	22	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	161	Low Level	22	23	<200	<0.008	WOOD FROM WALLS & CEILINGS, DUCTWORK METAL
09-Nov-00	162	Counting Room	8	17	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	163	Low Level	6	8	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	164	Low Level	-20	4	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	165	Counting Room	-6	27	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	166	Counting Room	-17	24	<200	<0.008	WOOD FROM WALLS & CEILINGS
09-Nov-00	167	Counting Room	-6	-17	<200	<0.008	WOOD FROM WALLS & CEILINGS, METAL
09-Nov-00	168	Counting Room	7	22	<200	<0.008	WOOD WALLS & CEILINGS, METAL, TRANSFORMERS
09-Nov-00	169	Counting Room	-8	15	<200	<0.008	WOOD FROM WALLS & CEILINGS, METAL, FILTERS
09-Nov-00	170	Counting Room	4	8	<200	<0.008	WOOD FROM WALLS & CEILINGS, METAL, FILTERS
09-Nov-00	171	Low Level	-9	5	<200	<0.008	FLOOR SWEEPINGS
09-Nov-00	172	Low Level	3	14	<200	<0.008	CORK FROM DUT WORK
09-Nov-00	173	Counting Room	14	20	<200	<0.008	DUCT WORK AND CORK
09-Nov-00	174	Counting Room	4	14	<200	<0.008	METAL DUCT WORK AND WOOD
09-Nov-00	175	Low Level	-5	8	<200	<0.008	WOOD FROM WALLS & CEILINGS

Date Stored	Drum #	Location Generated	Internal Sme dpm/1 min	•	External Radio Res	logical Survey ults mr/hr	Contents
14-Nov-00	176	Low Level	7	8	<200	<0.008	METAL VENTAILATION SYSTEM
14-Nov-00	177	Counting Room	36	41	<200	<0.008	LAB DOOR MOTOR
14-Nov-00	178	Counting Room	0	5	<200	<0.008	WOOD, METAL, STEEL, COPPER
14-Nov-00	179	Counting Room	-20	21	<200	<0.008	METAL PIPE, ELECTRICAL SYSTEM
14-Nov-00	180	Counting Room	6	65	<200	<0.008	PPE ::
14-Nov-00	181	Counting Room	9	31 -	<200	<0.008	RAD TRASH, HEPA FILTERS
14-Nov-00	182	Low Level	8	11	<200	<0.008	LIGHT FIXTURES, PIPE SYSTEMS
7(4)(0V-00	189	Elector Pic	PLASS BY	WASTEVER	200 P	0.160	PRAPTED MAPSINE SEFONE ELECTOP SAVIO
14-Nov-00	184	Ejector Pit	3	7	<200	<0.008	PIPE, PPE
14-Nov-00	185	Ejector Pit	-4	13	<200	<0.008	EJECTOR TANK DEBRIS
14-Nov-00	186	Ejector Pit	16	30	<200	<0.008	EJECTOR TANK DEBRIS, PIPE
14-Nov-00	187	Ejector Pit	-2	9	<200	<0.008	EJECTOR TANK DEBRIS
14-Nov-00	188	Ejector Pit	-0.6	22	<200	<0.008	PIPE
14-Nov-00	189	Ejector Pit	- 6	5	<200	<0.008	ELECTRICAL COMPONENTS
14-Nov-00	190	Ejector Pit	-0.4	19	<200	<0.008	PIPE
14-Nov-00	191	Ejector Pit	<u>-</u> 3	11	<200	<0.008	PIPE
14-Nov-00	192	Ejector Pit	3	16	<200	<0.008	MOTOR & PIPE
14-Nov-00	193	High Level Lab	7	8	<200	<0.008	CONCRETE FLOOR DEBRIS
14-Nov-00	194	High Level Lab	69	121	<200	<0.008	CONCRETE FLOOR DEBRIS
14-Nov-00	195	High Level Lab	-8	24	<200	<0.008	CONCRETE FLOOR DEBRIS
14-Nov-00	196	High Level Lab	-25	12	<200	<0.008	CONCRETE FLOOR DEBRIS
14-Nov-00	197	High Level Lab	4	17	<200	<0.008	CONCRETE FLOOR DEBRIS
14-Nov-00	198	High Level Lab	-8	-13	<200	<0.008	CONCRETE FLOOR DEBRIS
14-Nov-00	199	High Level Lab	6	17	<200	<0.008	CONCRETE FLOOR DEBRIS
14-Nov-00	200	High Level Lab	-3	10	<200	<0.008	CONCRETE FLOOR DEBRIS

Date Stored	Drum #	Location Generated		ear Sample # 00cm² max	External Radiological Survey Results dpm/100cm² mr/hr		Contents
20-Nov-00	201	High Level Lab	-9	26	<200	<0.008	CONCRETE FLOOR DEBRIS
20-Nov-00	202	Low Level	-29	-23	<200	<0.008	CONCRETE FLOOR DEBRIS
20-Nov-00	203	High Level Lab	7	15	<200	<0.008	CONCRETE FLOOR DEBRIS
20-Nov-00	204	Low Level	1	11	<200	<0.008	CONCRETE FLOOR DEBRIS
20-Nov-00	205	High Level Lab	5	15	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00	206	High Level Lab	-11	3	<200	<0.008	CONCRETE FLOOR DEBRIS
20-Nov-00	207	High Level Lab	-11	3	<200	<0.008	CONCRETE FLOOR DEBRIS
20-Nov-00	208	Ejector Pit	4	5	<200	<0.008	STAINLESS STEEEL TANK
20-Nov-00	209	Ejector Pit	9	21	<200	<0.008	STAINLESS STEEEL TANK
20-Nov-00	210	Ejector Pit	11	39	<200	<0.008	STAINLESS STEEEL TANK, PIPE
28-Nov-00	211	High Level Lab	0.7	16	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00	212	High Level Lab	2	19	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00	213	Low Level	19	40	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00		Low Level	31	35	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00	2/5	NUMBER NOT US	EDAM :		34.5		
20-Nov-00	216	Ejector Pit	-10	9	<200	<0.008	STAINLESS STEEL TANK, VALVE HEAD
20-Nov-00	217	Ejector Pit	-4	-3	<200	<0.008	PIPE, FLOOR SWEEPINGS, VALVE HEAD
20-Nov-00	218	Ejector Pit	13	28	<200	<0.008	CEIUNG VALVES, HEPA FILTERS, PPE
20-Nov-00	219	Low Level	-3	13	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00	220	Corridor 15	5	35	<200	<0.008	PPE FROM LAB OPERATIONS
28-Nov-00	221	Low Level	7	19	<200	<0.012	CONCRETE FLOOR DEBRIS
28-Nov-00	222	Low Level	-1.5	17	<200	<0.010	CONCRETE FLOOR DEBRIS
28-Nov-00	223	Low Level	7	9_	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00	224	Low Level	-16	22	<200	<0.008	CONCRETE FLOOR DEBRIS
20-Nov-00	225	Low Level	-3.6	11	<200	<0.008	CONCRETE FLOOR DEBRIS

Date Stored	Drum #	Location Generated		ear Sample # 00cm ² max	External Radiological Survey Results dpm/100cm² mr/hr		Contents
28-Nov-00	226	Ejector Pit	1	2	<200	<0.008	EJECTOR PIT VALVE HEADS
28-Nov-00	227	Ejector Pit	4	21	<200	<0.008	EJECTOR PIT VALVE HEADS
28-Nov-00	228	Ejector Pit	2.6	2.3	<200	< 0.013	FLOOR DEBRIS
28-Nov-00	229	Low Level	16	21	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00	230	Ejector Pit	1	9	<200	<0.008	EJECTOR TANK AND PIPING
28-Nov-00	231	Low Level	-3	-0.6	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00	232	Low Level	-12	-15	<200	<0.008	CONCRETE FLOOR DEBRIS
28-Nov-00	233	Low Level	-10	-6	<200	<0.008	CONCRETE FLOOR DEBRIS, PIPE
28-Nov-00	234	Low Level	-7	-0.6	<200	<0.008	PPE
28-Nov-00	235	Low Level	-18	17	<200	<0.008	REBAR, CONCRETE, PLASTIC
28-Nov-00	236	Low Level	9	23	<200	< 0.010	CONCRETE FLOOR DEBRIS
28-Nov-00	237	Low Level	6	8	<200	<0.010	SAND FROM PIPE TRENCH
28-Nov-00	238	Ejector Pit	-1.54	15	<200	<0.010	STEEL TANK, PPE, HEPA FILTER
28-Nov-00	239	Ejector Pit	5	25	<200	<0.008	STEEL DRAIN PIPES
01-Dec-00	240	Low Level	-14	5	<200	< 0.010	SOIL FROM PIPE TRENCH
01-Dec-00	241	Low Level	7	15	<200	<0.010	2" S.S. DRAIN LINE
01-Dec-00	242	Ejector Pit	-0.6	9	<200	< 0.010	EJACTOR TANK AND PIPE
01-Dec-00	243	Lab pipe trench	1	5	<200	<0.010	SOIL FROM PIPE TRENCH
01-Dec-00	244-	Low Level	13	18	<200	< 0.010	SOIL FROM PIPE TRENCH
01-Dec-00	245	Lab pipe trench	-21	-15	<200	<0.010	SOIL FROM PIPE TRENCH
01-Dec-00	246	Ejector Pit	12	23	<200	<0.010	STEEL TANK, PPE, HEPA FILTER, CONCRETE
01-Dec-00	247	Counting Room	-3	. 11	<200	<0.010	CONCRETE FLOOR DEBRIS
01-Dec-00	248	Counting Room	-17	2	<200	<0.010	CONCRETE FLOOR DEBRIS
01-Dec-00	249	Counting Room	3	4	<200	<0.010	CONCRETE FLOOR DEBRIS
01-Dec-00	250	Counting Room	12	25	<200	<0.010	CONCRETE FLOOR DEBRIS

Date Stored	Drum #	Location Generated		ear Sample # 00cm ² max	External Radiological Survey Results dpm/100cm² mr/hr		Contents
01-Dec-00	251	Counting Room	11	14	<200	<0.010	CONCRETE FLOOR DEBRIS
01-Dec-00	252	Counting Room	-4	· 4	<200	< 0.010	CONCRETE FLOOR DEBRIS
01-Dec-00	253	Counting Room	-13	-6	<200	<0.010	CONCRETE FLOOR DEBRIS
01-Dec-00	254	Corridor 15	5	19	<200	<0.010	PPE
01-Dec-00	255	Comidor 15	-28	17	<200	< 0.010	CONCRETE FLOOR DEBRIS
12-Dec-00	256	Corridor 15	-20	4	<200	< 0.010	CONCRETE FLOOR DEBRIS
12-Dec-00	257	Low Level	-19	-13	<200	<0.010	SOIL FROM PIPE TRENCH
12-Dec-00	258	Counting Room	-21	5	<200	<0.010	SOIL FROM PIPE TRENCH
12-Dec-00	259	Low Level	4	6	<200	< 0.010	SOIL FROM PIPE TRENCH
06-Dec-00	260	Corridor 15	5	9	<200	< 0.010	CONCRETE FLOOR DEBRIS
06-Dec-00	261	Corridor 15	4	36	<200	<0.010	CONCRETE FLOOR DEBRIS
06-Dec-00	262	Corridor 15	-4	17	<200	< 0.010	PPE
06-Dec-00	263	Corridor 15	-11	25	<200	<0.010	SOIL FROM PIPE TRENCH
06-Dec-00	264	Corridor 15	-4	-3	<200	< 0.010	PPE
06-Dec-00	265	Corridor 15	8	16	<200	< 0.010	SOIL FROM PIPE TRENCH
06-Dec-00	266	Counting Room	-21	-2	<200	<0.010	WOOD FROM BEHIND SLIDING DOOR
06-Dec-00	267	Corridor 15	-17	-9	<200	<0.010	SOIL FROM PIPE TRENCH
06-Dec-00	268	Counting Room	-12	9	<200	<0.010	CONCRETE FLOOR DEBRIS
06-Dec-00	269	Counting Room	-15	-12	<200	<0.010	WOOD AND PLASTIC DEBRIS
06-Dec-00	270	Counting Room	-7	- 5	<200	<0.010	SOIL FROM PIPE TRENCH
12-Dec-00	271	Lab Area	-3	5	<200	<0.008	STAINLESS STEEL DRAIN PIPE
12-Dec-00	272	Corridor 15	7	17	<200	<0.008	PPE
12-Dec-00	273	Counting Room	2.6	15	<200	< 0.004	WOOD, VACUUM DEBRIS
12-Dec-00	274	Ejector Pit	4.7	13	<200	<0.008	STEEL TANK
12-Dec-00	275	Ejector Pit	2.6	23	<200	<0.008	PPE, TANK, CONCRETE, PIPE

	·	<u> </u>					
Date Stored	Drum #	Location Generated	dpm/1	ear Sample # 00cm ²	Res	ological Survey sults	Contents
			min	max	dpm/100cm ²	mr/hr	
12-Dec-00	CONTRACTOR ASSESSMENT	Ejector Pit	-2	11	<200	<0.008	PIPE, FLOOR SWEEPINGS, PPE
12 Dec 00	237	THE RESERVE OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE	(OLASS) (B			SOUTH	PLOTE TRAINING PIPEL TO THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE OF THE SERVICE
12 DEC 00	278	Country Room	OLASS B	WASTE		80 truht	A CAST DRAIDCIDE PRE SCIENDO O ROTTACK, SAMPE, 12
12-Dec-00	279	Corridor 15	-3	13	<200	0.0260	PPE
18-Dec-00	280	Corridor 45	2.6	5	<200	<0.008	PPE
18-Dec-00	281	Corridor 45	5	13	<200	<0.008	PPE
18-Dec-00	282	Counting Room	-10	7	<200	<0.008	CONCRETE DEBRIS
18-Dec-00	283	Corridor 45	5	23	<200	<0.008	PPE
19 Dec-00	284	Comdor45	CLASS "B"	WASTE		/30 ur/in	O CAS CORAINENE PIPE
18-Dec-00	285	Corridor 45	-3	15	<200	<0.008	SOIL FROM PIPE TRENCH, VACUUM DEBRIS
18-Dec-00	286	Counting Room	-2	1	<200	< 0.010	CONCRETE FLOOR DEBRIS
18-Dec-00	287	Counting Room	11	24	<200	<0.010	POLY, CONCRETE FLOOR DEBRIS, SOIL FOR TRENCH
18-Dec-00	288	Corridor 45	-7	3	<200	<0.010	VACCUM DEBRIS, POLY
18-Dec-00	289	Corridor 45	- 3	15	<200	<0.008	PPE
18-Dec-00	290	Ejector Pit	14	31	<200	<0.010	CONCRETE FLOOR & WALL DEBRIS
18-Dec-00	291	Ejector Pit	9	17	<200	<0.010	CONCRETE FLOOR & WALL DEBRIS
18-Dec-00	292	Counting Room	-9	-3	<200	<0.010	SOIL FROM PIPE TRENCH, PPE
18-Dec-00	293	Ejector Pit	-1	9	<200	< 0.010	CONCRETE FLOOR & WALL DEBRIS
18-Dec-00	294	Ejector Pit	-3	1	<200	< 0.010	CONCRETE, POLY, VACCUUM DEBRIS
18-Dec-00	295	Corridor 45	-5	-4	<200	<0.010	POLY, PPE
18-Dec-00	296	Corridor 45	-2	-1	<200	< 0.010	POLY, PPE, FILTER HOUSING
18-Dec-00	297	Corridor 45	-10	0	<200	< 0.010	POLY
18-Dec-00	298	Corridor 45	-13	7	<200	< 0.010	CONCRETE FLOOR & WALL DEBRIS
18-Dec-00	299	Ejector Pit	-16	8	<200	<0.010	CONCRETE FLOOR & WALL DEBRIS
18-Dec-00	300	Corridor 45	14	16	<200	< 0.010	WOOD, PPE, POLY

Date Stored	Drum # Location Generated		Internal Smear Sample # dpm/100cm ²		Res	ological Survey Sults	Contents
			min	max	dpm/100cm ²	mr/hr	
18-Dec-00	301	Ejector Pit	3	19	<200	<0.010	CONCRETE EJECTOR ROOM
18-Dec-00	302	Ejector Pit	-13	2	<200	< 0.010	CONCRETE EJECTOR ROOM
18-Dec-00	303	Ejector Pit	-1.5	13	<200	<0.008	CONCRETE EJECTOR ROOM, S.S. PIPE
18-Dec-00	304	Ejector Pit	-3	19	<200	<0.006	HEPA FILTER AND VACCUUM DEBRIS
04-Jan-01	305	Counting Room	0.46	17	<200	<0.008	PPE
04-Jan-01	306	Counting Room	2.6	5	·<200	<0.008	PPE
04-Jan-01	307	Counting Room	-1.54	21	<200	<0.008	CONCRETE DEBRIS
04-Jan-01	308	General	5	25	<200	<0.008	PPE
04-Jan-01	309	General	2.6	13	<200	<0.008	PPE, POLY
04-Jan-01	310	General	3	23	<200	<0.008	VACUUM / HEPA USACE # 43064
04-Jan-01	311	General	5	17	<200	<0.008	PPE, CONSTRUCTION DEBRIS, vaccuum head USACE #43066
04-Jan-01	312	General	-7	23	<200	<0.008	RAD TRASH, CONSTRUCTION DEBRIS, vacuum head USACE #43085
04-Jan-01	313	General	-13	15	<200	<0.008	RAD TRASH, CONSTRUCTION DEBRIS HEPA filter housing, Porter Cable say

NOTE: TOTAL OF 307 DRUMS OF CLASS "A" WASTE NOTE: TOTAL OF 4 DRUMS OF CLASS "B" WASTE



Subsidiary of Duratek

740 Osbom Road • Barnwell, Scuth Carolina 29812

November 6, 2002

ATTN: Harold Stout DURATEK, INC. P.O. BOX 2530 1560 BEAR CREEK ROAD OAK RIDGE, TN 37830

Reference: Radioactive Waste Shipment - Shipment ID Number 11595

Dear Harold Stout,

As required by 10 CFR Part 20, South Carolina Title A, and Barnwell Waste Management Facility Disposal Criteria (S20-AD-010), this letter is notification that the shipment referenced above has been received and disposed of at the Barnwell Waste Management Facility. A signed copy of the Form 540 for this shipment is attached as acknowledgment of the acceptance of this waste shipment. This waste meets all the Barnwell Waste Management Facility acceptance requirements and was disposed of in accordance with the Barnwell Site's License.

If you have any questions regarding this letter, please contact the Prior Notification Plan Department at (803) 541-5017.

Sincerely,

James W. Latham

Vice President, Barnwell Operations

Outbound Manifest Breakdown Report

By Outbound Manifest 1d

Manifest Nbr			Transport	Permit Number	Shipping Date	Site Name			
1024083			0272-41-02->		10/31/2002	Barnwell Was	te Munagement Faci	lity	
Customer Name	Number	Phone Number	Manifest Number	Received Date	Wst Wgt (Lbs)	Vol (Ft3)	Activity (mCi)	SNM Grams	SM Lbs
Aventis Pharmaceuticals/Cincinnati	2812	(513) 948-6557	648-GTS-01-031	12/21/2001	16.0	6	83.876	· 	0E+00
Dominion Generation/Millstone	77	(860) 444-4227	77-02-076-2	08/16/2002	291.0.	6.8	1170.9359	0	0E+00
Exelon Corporation/Amergen/Oyster Creek	357	(609) 971-4544	357-OC:-1018-01	09/04/2001	602.0	12	567.208	0.0000725	00+00
Exelon Corporation/Dresden Unit	2164	(815) 942-2920 x2368	2164-DW-02-045	04/24/2002	539.0	12.8	626 7038	0.0013386	013100
Exelon Corporation/LaSalle Station	240	(815) 415-2395	240-LW02-11	06/07/2002	11.0	1.36	.2582	0	. QE+GO
			240-LW02-19	08/12/2002				:	
Northrop Grumman / Linthicum	1481	(410) 765-2318	54-12302	01/23/2002	46.0	2.5	2129	0	OT:+G0
Rochester Gas & Electric Co./Ginna	331	(585) 771-3118	331-2001-31	10/31/2001	120.0	4.6	1637,4718	0.0004952	0E+00
US Army Corp of Engineers	2926	(410) 962-9184	2167-T013850	07/23/2001	967.0	13.1			
						Measured:	113.4904	٥	0E+00
Viacom/Waltz Mill	481	(724) 722-5924	481-LRW2001-316-RT 481-LRW2001-347-RT		1,332.0	40.44	1350.8963	0.084644	3.891F-03
Wyeth-Ayerst Research/Lederle	673	(845) 732-3784	673-T015802PEARLR 673-T021070 673-T022688	03/15/2001 03/15/2002 07/22/2002	365.0	13.2	453.27	0	0E÷00
· · · · · · · · · · · · · · · · · · ·				Totals	4,289.0	112.8	8019.62	0.0865502	3.891E-03
						Measured:	113.4904	0	06:00
					1	Grand Total:	8133.1104	0.0865502	3.891E-03

											H5" 1	2757
FORM 540 E UNIFORM LOW-LEVE WASTE MAI		ment Facility		Bear Creek Operations	:	SHIPMENT ID NUMBER 1102-11595 COLLECTOR	FORM FORM	540 AND 540A 541 AND 541A 542 AND 542A IONAL INFORM		10 PA	GE(S) pages)	ber on all confinuation
Shipping P			Cul. Mile. Wif Avena			X PROCESSOR	4				024083	
1. EMERGENCY TELEPHONE NUMBER (Include (885) 481-0222			SUCTRANSPORT PERMIT NUMBER SHIPMENT NUMBER 1024083			GENERATOR TYPE (Specify)	CONSIGNEE - Name and Facility Address Barneell Waste Management Facility Operated By Chem Nuclear Systems			CONTACT Licensing Department TELEPHONE NU		
RGANIZATION Duralek, Inc.			CONTACT Harold Slout			TELEPHONE NUMBER (Include Area Code) (865) 481-0222	Osbom Road Barrwell, SC 29812			(include Area Co 803		
2 IS THIS AN "EXCLUSIVE USE" SHIPMENT?	1. TOTAL NUMBER OF	T		ame and Address		EPALD NUMBER	SIGNATI	IRE • Authorize waste rec		cknowledgir	ng DATE	
[X] YES	PACKAGES (DENTIFIE ON THIS MANUFEST	[מ	Hillman Trans	port Services		TNED-88-778-9065	3		N		11-6	, - 02
[]140	ON THIS MANUES!	1	1660 Bear Cre			SHIPPING DATE		3		10. CERTA	ICATION	
WASTE REQUIRING A PAINO MANIFEST ACCOMPANY	epa manifest number		CONTACY			TELEPHONE NUMBER (Include Area Code)	This also d	This is to ceitily that the herder-named materials are properly classified, described, packaged, marked, and labeled and in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certified that the materials are classified, packaged, marked, and labeled and in proper condition for transportation and disposal in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state			TODAY OLYNGUMAA SIVI	
THIS SHIPMENT? If "Yes", provide Manifest Number	N/A		Karen Kirby			600-233-6933	regulation	L EZED SIGNATU	()	ME		DATE /
			Dan	uthorized carrier actinon		10-31-02		>wit	that !	Technic	18. TOTAL WEIGHT	(8/3//02 19. IDENTIFICATION
11. U.S. DEPARTMENT OF TRANSPORTAY findluding proper shipping name, h UN ID number, and any additional i	azant class,	12 Dot Label "Radioactive"	TRANSPORT INDEX	PHYSICAL AND CHEMICAL FORM	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	16. Ridividual Radionuclides		TOTAL PACKA MBq		17. Lsa/Sco Class	(nze subcobuste auge) OS AOTTRE 19: 10.14T MEIGHT	Number of
RADIOACTIVE MATERIAL; LOW SPECIFIC ACT FISSILE EXCEPTED; RQ (RQ = NUCLIDES) AIR FILTERS; BUILDING RUBBLE; CAST IRON; UQUID FILTERS; METAL; SMOKE DETECTORS	DAW; DEWATERED	NA	NA ·	SOLID METAL OXIDES	243; CM-244; CO-57; 137; EU-154; FE-55; I 59: NF-83; PU-238; PI	-14; CE-141; CE-144; CH-24 CO-58; CO-60; CR-51; CS- FE-58; H-9; H-129; IM-54; NE L-238; PU-240; PU-241; RU- C-60; U-234; U-235; U-238;	134; CS- 1-85; NI- 103; SN-	300925.0848	8133,1104	LSAH	300 ¥3	CNS-21-300-10 IP-2
				,				•				Single Second
					•	•	٠.					
		. •										
FOR CONSIGNEE USE ONLY	SC DI	TE REPECTO EPT OF HEAL VIRON CONTI	TH	prepared in ac regulatory eg- effective Barn with all applic	ccordance with a radio ency and has been ins nwell Site Disposal Crit able laws, rules and re	~11. 14	warporq	thich has been a	approved by th Carolina Radi	ie Nytiear R kariive Mat	legulatory Commission (ertal License No. 097 as	swended and me
Form 540 /10-AM	.,441	· · · · · · · · · · · · · · · · · · ·		Title and Orga Telephone No	/02 Signatur inization Technical a. 865) 481–023	Speak of - D	iad j	n,				

APPENDIX D RADIATION WORK PERMITS

ST	ALBANS PROJECT I	AP-012-01 RADIATION WORK P	ERMIT
Job Supervisor	Date	9-19-00	No. 00-01
Location of Work:			·
Description of Work: IL	ISPECT, Sampl	e mastic, perform	initial Butry
Survey.			
<u> </u>		DIOLOGICAL CONDITIONS	
Location	Contamination Levels	; Radiation Levels	Airborne Concentrations
Bidg 90 .	tenknown	·/WR/hr	unknown
·			
-	PEOUBED BAD	IOLOGICAL CONTROLS	
3 X Coveralls		OLOGICAL CONTROLS Glove Liners	Lapel Air Sampler
Hood		A Plastic Shoe Covers	Lab Coat
Surgeons	Can	Rubber Shoe Covers	
≿ Surgeons		Tape Gloves to Sleev	
Rubber G	loves adiation Worker(s)	Plastic Suit	∤TLD .
SPECIAL INSTRUCTIONS		epenings. 6) I	F No Rubber Shoe
covers use dou			protors required for
inital entry (3	D TXVEX	•	
CICNATURE INDICATES T	WATYOU WAYE BEAD AN	ID HAIDEDOTAND THE BA	ADIOLOGICAL CONDITIONS AND
SIGNATURE INDICATES I		ND UNDERSTAND THE RA INTROLS	ADIOEOGICAL CONDITIONS AND
, Name	Signature	Name	Signature
Etennek	M		
CARLOS JOFAT	Borbos felet		
Curtis Alitles	Cuto Wals		
			<u> </u>
APPROVED BY: U	uto / Wal	<u> </u>	ATE: 9-19-00
REAPPROVED BY:		D.	ATE:
RWP TERMINATED BY:	uts J. Hale	D.	ATE: 9-21-00
)			
AP-012	Cabrera	Services, Inc.	Page 9 of 11

			4		
S		AP-012-0			
ST.	ALBANS PROJE	CT RADIATI	ON WORK P	ERMIT.	
Job Supervisor	Па	le 9 - 20-		No.	
Goo Cape, vice.		7-20-	00	™00-0≥	
Location of Work: Bldg	90 LAB	St Alb	377		
Description of Work: In	pert, Somo	ole, and	remeval	ef material	
	SUMMARY OF	PADIOLOGICA	V CONDITIONS		
Location	Contamination Le		adiation Levels	Airborne Concentr	ations
LAB	186-1675 d	gm/	10 ur/an	Z M.DA	
Holeinfloor	2710 dom	100km2	= 85 uR/	2 3 2000	
1991-111191	- JIV AJOM	//sccpr	<u> </u>	~ / / / / /	
		<u>l</u>			
		ADIOLOGICAL			1
X Coveralis Hood	Ty√tX		ELiners Covers	术 Lapel Air Samp Lab Coat	ier
Surgeons Ca	ap		er Shoe Covers	x Pre-Job Meetin	g
スSurgeons Gl	oves	JXTape	Gloves to Sleev	es Continuous HP	
1xwerk 6		Dlasti	A C1-15	Coverage	
Rubber Glove Trained Radi	es ation Worker(s)	Plasti	C Suit	λ TLD	
SPECIAL INSTRUCTIONS:	anon violitoi(e)			· · · · · · · · · · · · · · · · · · ·	
	rieves when	meving m	aterial (3)		2000
	of face of			required when i	cesting
SIGNATURE INDICATES THA		AND UNDERS	EX 3 .	DIOLOGICAL CONDITION	SAND
OIGHAI GILL INDIGATED STIA	() JOSTIATE NEAL	CONTROLS			
Name	Sigpature ,	N:	ame	Signature	
EDWARD TOHKER SE	man Johnson	loculio s	lakon -	Cornelius Incleson	
James Brackson How	e Bisden	1 60 Your	X	420n S	
Scott Wynord &	446.5	Jan Lom		1 Same	
1/2 - Ochimus 1/2				and follows:	
THE RESTORES		·	•		·
APPROVED BY: Cuts	d. Noles		DA	TE: 9-20-00	
REAPPROVED BY:			DA	TE:	
RWP TERMINATED BY:			DA	TE:	
• ,		•			
•					
AP-012	Cabre	ra Services, l	nc.	Page 9 of 11	

				
	ST. ALBANS PROJEC	AP-012-01 T RADIATION W	ORK PERI	MIT
,				
Job Supervisor	Date	9-25-00		No. 90-03
	31dg 90 - LAF	المستقدين والمراجع والمراجع والمراجع والمستقدين والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع	کیدہ	
Description of Work:	Somple SE	w, seven	Rasy	-25ec
		RADIOLOGICAL CON		
Location	Contamination Lev		Levels	Airborne Concentrations
Hole in floor	(ab = 180-1675	dpm = 850	iR/On	
•	. 10	Kmit		
			•	
	REQUIRED RA	ADIOLOGICAL CONTI	ROLS	<u> </u>
		Glove Liners Plastic Shoe Rubber Shoe Tape Gloves	Lapel Air Sampler Lab Coat Pre-Job Meeting Continuous HP Coverage	
	Radiation Worker(s)	Plastic Suit		X TLD
SPECIAL INSTRUCTION		must be RESPICATOR Y	yunne	when collecting
Sample.	, C 44 +, MC).	K CSY 118 TOY	- CONINCI	T WHEN CHIESTING
		AND UNDERSTAND T	HE RADIO	OGICAL CONDITIONS AND
Name	, Signature	Name		Signature
Henry W. Sigrat	Kenn W. Seinst		-	
Curlis Hales	Cuty Hale			
PPROVED BY: C	to LHales	Hus alaston	DATE:_	9-25-00
WP TERMINATED BY:	Cuto L. Wale	3	DATE:_	/o-3-6V
AP-012	Cabrer	a Services, Inc.	· · · · · · · · · · · · · · · · · · ·	Page 9 of 11

	ST. ALBANS PROJECT I	AP-012-01	ERMIT
	*	·	
Job Supervisor Kuct 005 fey-	Date	0-4-00	No. 00 - 03
Location of Work: Du	100106 10 "IX	STECTOR PLT"	
Description of Work:	RFORM RADIOLOGICAL	- sucrous (Sm	nPeals) AND
VISUAL INSTE		DIDLOGICAL CONDITION	Vaccum, Equip removal
Location	Contamination Levels	Radiation Levels	Airborne Concentrations
a WESCHOK PIT IN R.	em Lives du line	unz 10-12 uR/1	HR BZ LOPER OR G/A
	(Coo dom / wo cm 2)		
		m-/H	be Pertoduco Durist
	REQUIRED RADI	OLOGICAL CONTROLS	ENTRIES
★ Coveral Hood	IS (TYVER OR ECTIVI)	✓ Glove Liners ✓ Plastic Shoe Covers	X Lapel Air Sampler Lab Coat
Surgeor X Surgeor	ns Cap ns Gloves (Z PAIK)	Rubber Shoe Covers X Tape Gloves to Sleev	
			Coverage (wrocomered
①Rubber ✓Trained	Gloves Radiation Worker(s)	Plastic Suit	XTLD
	S: O= FOR HONDLING SI	mulles on Pilino	Sum Desars
2) NOTIFY HP Paran	TO ENTRY (3) LO	CK POOR WOW EX	(1) Respirators
required when No	economy		
SIGNATURE INDICATES		D UNDERSTAND THE RA	DIOLOGICAL CONDITIONS AND
Name	, / Signature	Name	Signature
Marc Burnson	Aller believ n	WRK KUCERD	The Stages
Plobert Test	W Sold Wall	SCOP WYNEA	Lest Want
JOHN DEVINE	1 Teme &	allow Tohnson	Edurane Johnson
Curtis L. NACES	Couto J. Hols	ames Brackson	Jan & Brown
	1.166	no. C	
APPROVED BY: HOMONI	, M. Jando / Cl	DA	TE: 10-4-00
REAPPROVED BY:		<u>(/</u> DA	TE:
RWP TERMINATED BY:		DA	TE:
• •	•		
AP-012	Cabrera S	ervices, Inc.	Page 9 of 11

ST	. ALBANS PROJEC	AP-012-		ORK PER	МТ
Job Supervisor Methal	Date Date	10-9-	00		No. 00-05
Location of Work: Bldg	90 LaB				
Description of Work:	sexform remove	al of	3,005	tos tile	4 mastic.
	SUMMARY OF R	ADIOLOGIC	CAL CON	IDITIONS	
Location	Contamination Leve		Radiation		Airborne Concentrations
LAB	180 - 5000	Dom	10-	45 ur/an	GA Samples to
		10000			
			0.010 -12	0.045 ne/a	the token During
•					entries
	REQUIRED RA				
x Coveralis Hood Surgeons x Surgeons		χ Pia Rut		Covers (23 Covers to Sleeves	Continuous HP
Rubber Gl X Trained Ri	oves adiation.Worker(s)	Pla	stic Suit		X Coverage (intentified X TLD
SPECIAL INSTRUCTIONS :		el of -	mastic	Q	notify HP prior
	sek door wa	~ exite	Respi	rádov re	
during ashesler/	nastic removal	*	 -		
SIGNATURE INDICATES T		AND UNDE	RSTAND	THE RADIO	LOGICAL CONDITIONS AND
Name	Signature		Name		Signature
Cher Hleson &	digit los hom	CARLOS	Jofa	T. 6	antos Que fafeet
MARC BIANCO Y	Man & Break				
James Bradan					
MICHHEL EREER 1	Michael Sceen		•		
	7//				
APPROVED BY: Cond	s L. Hales /C	into J	Kales	DATE	10-9-60
REAPPROVED BY:			· · ·	DATE:	· -
RWP TERMINATED BY:				DATE:	
.	•		,		
AP-012	Cabrer	a Services	Inc.		Page 9 of 11

Page 9 of 11

AP-012

ST.	ALBANS PRO		2-012-01 ADIATION WOR	K PER	MIT
	umbo	Date	10-10-00		No. 00-05
Location of Work: Bidg Description of Work:	90 LAS emoial Of	tile	in ball 4 m	Dites	Ashestoes
Location	SUMMARY Contamination		LOGICAL CONDIT		Airborne Concentrations
LAB -	- 100 - 600				Respirators require
		. cm>		,	while performing
<u> </u>			OGICAL CONTRO		this task
Hood Surgeons C X Surgeons G X Rubber Glov X Trained Rac SPECIAL INSTRUCTIONS:	loves (2 pour) ves (wark glaus liation Worker(s) D. Wark Jilly prints	is) Slovees mag	Glove Liners XPlastic Shoe Co Rubber Shoe Co XTape Gloves to S Plastic Suit	Scannett	Lapel Air Sampler Lab Coat Pre-Job Meeting Continuous HP X Coverage (internity and X TLD Respirators HP Grant No
SIGNATURE INDICATES THA	AT YOU HAVE RI		ROLS	E RADIO	LOGICAL CONDITIONS AND
Name	Signature		Name		Signature
APPROVED BY: CJ.	Hale			DATE:	10-10-60
REAPPROVED BY:	·	· · · · · · · · · · · · · · · · · · ·		DATE:	
RWP TERMINATED BY:		•		DATE:	

Cabrera Services, Inc.

. s	T. ALBANS PROJEC	AP-012-01 T RADIATION WO	ORK PERI	MIT	
Job Supervisor KuRT 005te		10-11-00		No. 00-06	•
	r's toket Bldg Emoval Of Egy	90 Sporent + ma	erial		
	SUMMARY OF R	ADIOLOGICAL CON	OITIONS		
Location	Contamination Leve			Airborne Con	centrations
men's Toilet	-1-20K	8-12 1	BZ Lapel	٠ اصدو	
		`		to se se	nform ed
			•	طيد:مع م	tou.
		DIOLOGICAL CONTR			
メCoveralls Hood Surgeons 大Surgeons		X Glove Liners X Plastic Shoe C Rubber Shoe X Tape Gloves t	Covers	≺Lapel Air S Lab Coat Pre-Job M Continuou	eeting s HP
Rubber G 入 Trained F	Gloves Radiation Worker(s)	Plastic Suit		メ Coverage ス TLD	interniffen
SPECIAL INSTRUCTIONS		, , , , , , , , , , , , , , , , , , ,	eques.	(a) notity 1	10
prior to work	B) 100K 9001 1/2	7 on entry,			
	·				
SIGNATURE INDICATES T		AND UNDERSTAND T CONTROLS	HE RADIOL	OGICAL CONDIT	rions and
Name .	Signature	Name		Signature	
EDWARD JOHNSON K	Aured Schoon	•. •.	•		
Sames Brackson	and Brocker		,		
KUNT OBTOMAN	12				
10. CASTO MAN					
APPROVED BY: Cuts	J. Wales		DATE:_	10-10-00	-
REAPPROVED BY:	•		DATE:_		
RWP TERMINATED BY:	•		DATE:		
<i>k</i>	•		•		
AP-012	Cabrera	Services, Inc.		Page 9 of	11

S	ST. ALBANS PROJEC	AP-012-01 T RADIATION WORK	C PERMIT
Job Supervisor	Date	11-7-00	No. 8. 9 - 0. 7
Location of Work: (3)	dg 90 Injec	tor Pit	
Description of Work: C	utting of Tank	s using Sauall	only.
		ADIOLOGICAL CONDITION	
Location	Contamination Leve	els Radiation Leve	els Airborne Concentrations
Imjector Dit 100	m = 1000 2 pm/16	0.010-0-012 m	W/De-
			be performed during
	REQUIRED RA	ADIOLOGICAL CONTROL	s .µ
x Coveral Hood Surgeo x Surgeo	ns Cap ·	Glove Liners ** Plastic Shoe Cove Rubber Shoe Cov ** Tape Gloves to Si	vers Pre-Job Meeting
Rubber X Trained	Radiation Worker(s)	Plastic Suit	k Coverage(፲ክጵላଲi አ TLD
	s: () For cutting		paterials. D. notify HO
prior to entry		you and the	airador required at all
	THAT YOU HAVE READ	AND UNDERSTAND THE	RADIOLOGICAL CONDITIONS AND
- Name	Signature	Name	Signature
In lamas	1. Lemas		
Seat William	1 4/1 =		,
	- And Mary Mary		
APPROVED BY:	to J. Noles		DATE: 11 - 7-0 Q
REAPPROVED BY:			DATE:
RWP TERMINATED BY:			DATE:
AP-012	Cabre	ra Services, Inc.	Page 9 of 11

ST		P-012-01 ADIATION WORK PE	RIMIT
Job Supervisor SCH Wyng R Location of Work:		13-00	No. 00-08
Description of Work: 35		encrote floor-	Sigseles el
SOU GIOLO SCARC	SUMMARY OF RADI	OLOGICAL CONDITIONS	
Location	Contamination Levels	Radiation Levels	Airborne Concentrations
Lab	8-900000 K(#x	10-14 uk/em	BZ Lapel E GA Somples to be
	1- 426 dom 100 cm		entres.
	REQUIRED RADIO	LOGICAL CONTROLS	
X Coveralls X Hood Surgeons		Glove Lingus X Hestic Shoe Covers Rubber Shoe Covers Tape Gloves to Sleeves	
Rubber Glo	oves diation Worker(s)	Plastic Suit	X TLD
special instructions: flap to le instal Nepa to the 30 m	led @ enterance to		Jockhammer @ plastit High Level Lab. Arist to work.
SIGNATURE INDICATES TH		UNDERSTAND THE RADIO	DLOGICAL CONDITIONS AND
Name	Signature	Name	Signature
Scott WYNTA	Sull organia		
James Brackson, +	amor Bugoling		
EDUARD THANSON C	had Johnson	·	;
		·. <u> </u>	
APPROVED BY: Cut	J. Hales	DATE	: 11-13-00
REAPPROVED BY:		DATE	-
RWP TERMINATED BY:		DATE	<u>:</u>
AP-012	Cabrera Se	rvices, inc.	Page 9 of 11

APPENDIX E

RADIATION SURVEYS

(PRE-JOB, DURING JOB, & POST JOB)

Location: Wark Zone Bld	RWP#	00-07		Survey #	087	Survey Type:	ted Release	pg. 1 of 1
Smear Results DPW100cm^2 No. a	Banelo 0. # 287 0. # 296 0. # 396 0. # 302	Courts - 184 - 171 - 167 - 136 - 151 7 - 160 7 - 167		contact	reading .			
20 45 21 46 22 47 23 48	1				· ·		BKG= 10	m/hr.
21 46						• • • • • • • • • • • • • • • • • • •	BKG= 10	m/hr.
21 46 22 47 23 48 24 49 25 V V 50 U V Comments At Cours 2	Surveyed By:	Date:	Instrument	Serial # a Elf.	ρ Εff. α Bkg.	β Bkg 【Cal. Due	B K G = 10	~/h~,
21 46 22 47 23 48 24 49 25 V 50 U V Comments		4	2929 1	Serial # a Elf.	ρ Εff. α Bkg.	β Bkg 【Cal. Due	Key	** Boundary
21 46 22 47 23 48 24 49 25 V 50 U V Comments At Cours 2	Surveyed By:	Date:	2929 1	Serial # a Elf.	ρ Εff. α Bkg.	β Bkg Cal. Due 8 6 .15 3 -28-9)	Key Smear	
21 46 22 47 23 48 49 25 V V 50 V V Comments	CSHORS	12-21-00	2929 1	Serial # a Elf.	ρ Εff. α Bkg.	β Bkg Cal. Due 8 6.15 3-38-0	Key Smear Oose Rale mithi	*-° Boundary
21 46 22 47 23 48 49 25 V V 50 V V Comments		4	2929 1	Serial # a Elf.	ρ Εff. α Bkg.	β Bkg Cal. Due 8 6 .15 3 -28-9)	Key Smear Dose Rale mr/hr	*-° Boundary

Location:	RWP#		Survey#	Currou Tuno:		
work zone, c	50-00 "" 00-02		086 08	Survey Type:	d release	pg. 1 of 1
Smear Results		<u></u>		1 1200111-011	7 11 1000	100.1011
DPM/100cm^2		•]
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4 - 29 29	, — » ·		23, #30			
5 14 30	3 #288 - 162 (B) 288 - 153	1			1.	ì
6 31 31			æy, #30	1 - 178	V	l
7 17 32	B #290- 173					
8 9 33	Q 290 - 190				•	
9 4 34	Q #291 - 176					ļ
11 9 36	1		e .	,		
12 8 37	8 291 - 168					
13 1 38	® #392- 157.	<u> </u>	•		•	
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15 4 40	D #293 - 168	1	•	•		i
17 0 42	@ 293 - 159					
18 7 43	(3) #nn	İ				
19 +0 44	13 #294 - 160		0 - 1 - 4 0 *	. به هساری ه	ic & BKG	· .
20 8 45	(H) 294 - 157	. \	Contest Views	3 001,1114		10
	(3) #395 - 156		contect reading		BKG= 100	you
22 /4 47 23 + 48	160					·]
24 19 49	Ø ≠298 - 147				•	
25 V 50 V V						
Comments All Courts 3	1 (B) _298 - 166		·			
min	@ #299 - 144		•			
	20 299 - 147	4				
		Instrument Serial #	α Eff. β Eff. α Bkg. β Bkg		Key	
		2929 163827	.486 81.6			- Boundary
		Med 19 87132	WA -	3-7-01	Dose Rate mr/hr Direct Reading	A/S Location
<u></u>	Reviewed By: Date:				DPM/100 cm*2	
	·			Δ	Grab Sample	

Localion: Work Zone (3/40 912 RWP#	60-00		Survey #	085		Survey Ty	pe;		\neg	
Smear Results	749 701	00-02		<u></u>	600	·	Ruc	<u> </u>			g. 1 of 1
DPM/100cm^2	Smeans)		•							
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	Reviewed By:	Date:						•	OPM/100 cm^2		
	<u> </u>							Δ	Grab Sample		

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oss ruin.	Smear Results DPM/100cm^2 No. 1962 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060 No. 2060	, KIAT	W.IA L					. 50	nlea r	4-, 10	(piin)	SSLIGHT HAVE	Direc	Cm X Fr	المعدد المع
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	Reviewed By:	Dale: **						•	Direct Reading DPM/100 cm^2		
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Location:	rk Zone RWP# 00-02	Survey	'# 080	Survey Type:		pg.	. 1 of 1
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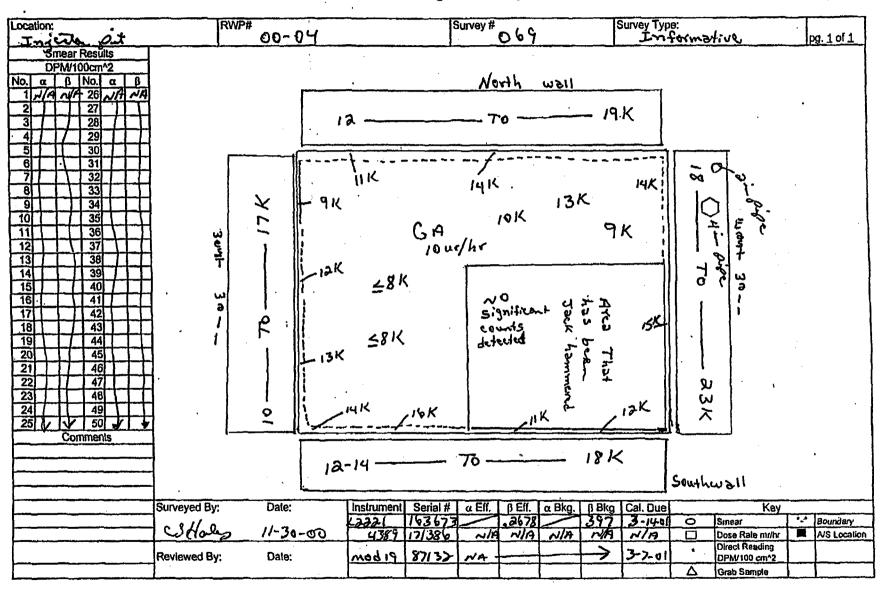
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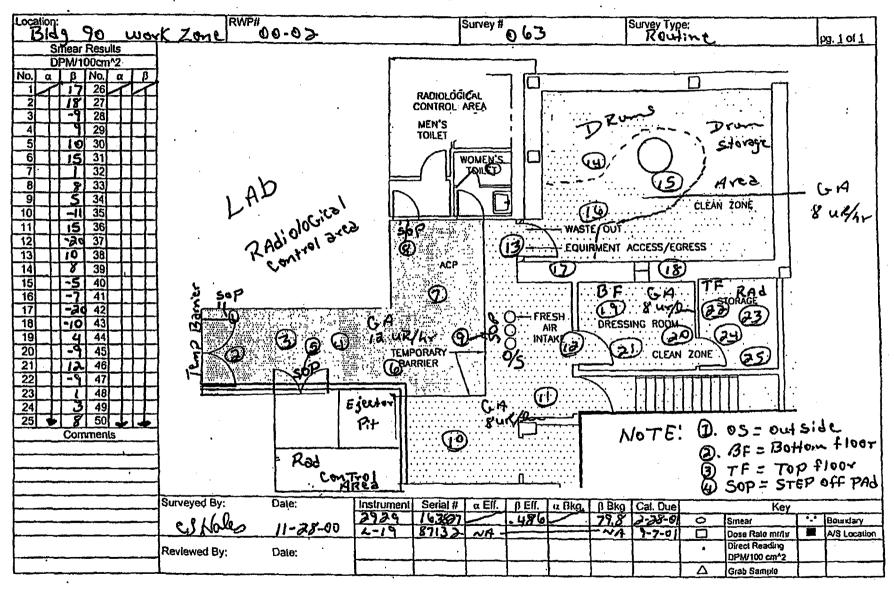
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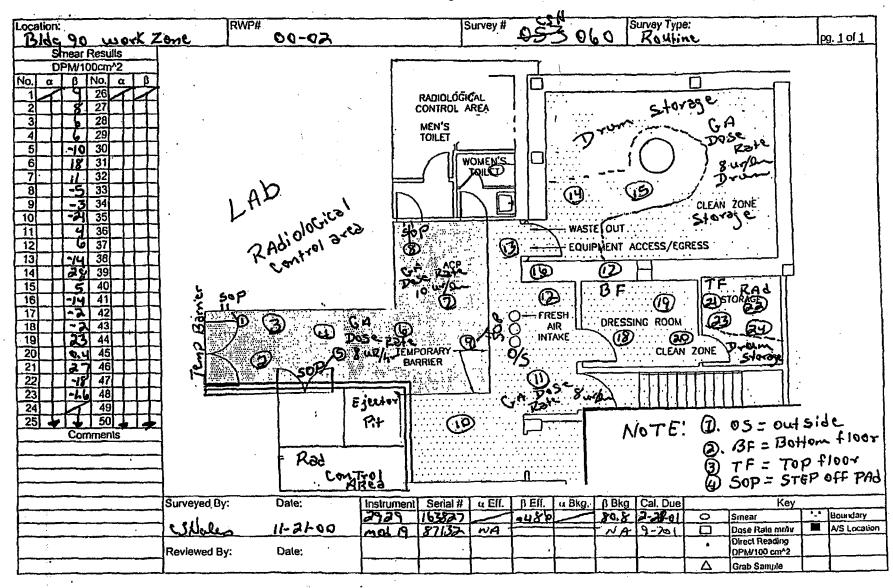
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Buicons 90 OP-001-02 Radiological Survey Sheet

Lander.	13-26-60
DT. ALBANS	Survey # csft 067 Survey Type: O0-07 Survey # csft 067 Survey Type: Pg. 1011
Smear Results DPM/100cm^2	(EAD - 1/2" X /2" (-1/2" THICK) SHEETS - 54 TOTAL -
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	Reviewed By:	Date:						 	DPM/100 cm^2	
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OP-001

CABRERA SERVICES, INC.

Page 15 of 15





Location:	RWP#	· · ·		Survey# . CJH		Survey Type:		
Bldg 90 work	zone (20-05		Survey#055	0.59	Survey Type:	d release	pg. 1. of 1
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		Date:	10000				Direct Reading	
	Reviewed By:	Date:					· DPM/100 cm^2 △ Grab Sample	
	<u> </u>						△ Grab Sample	

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9 33 34 10 -4 35	(2)	#216	162 63	E 2				
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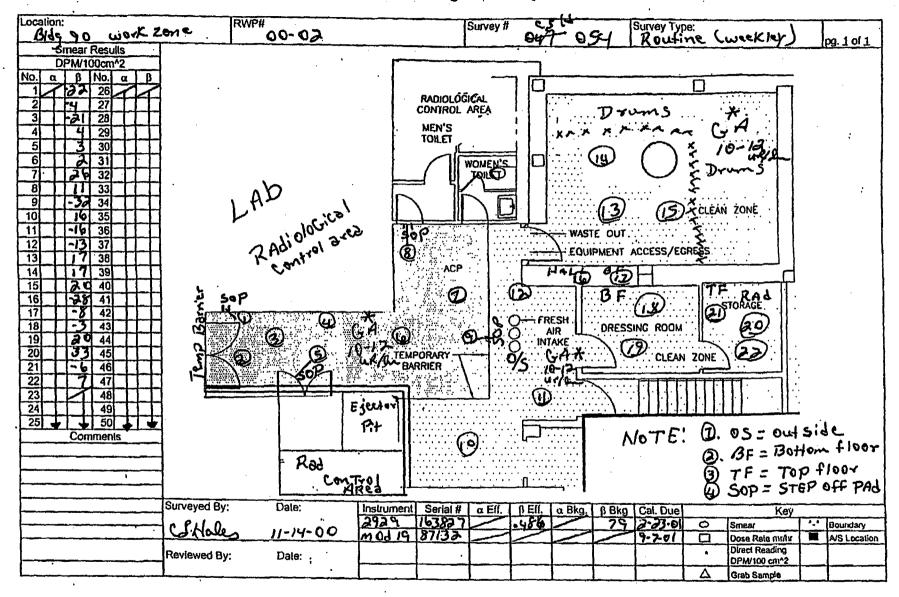
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	Reviewed By:	Date:	<u> </u>								DPM/100 cm^2		
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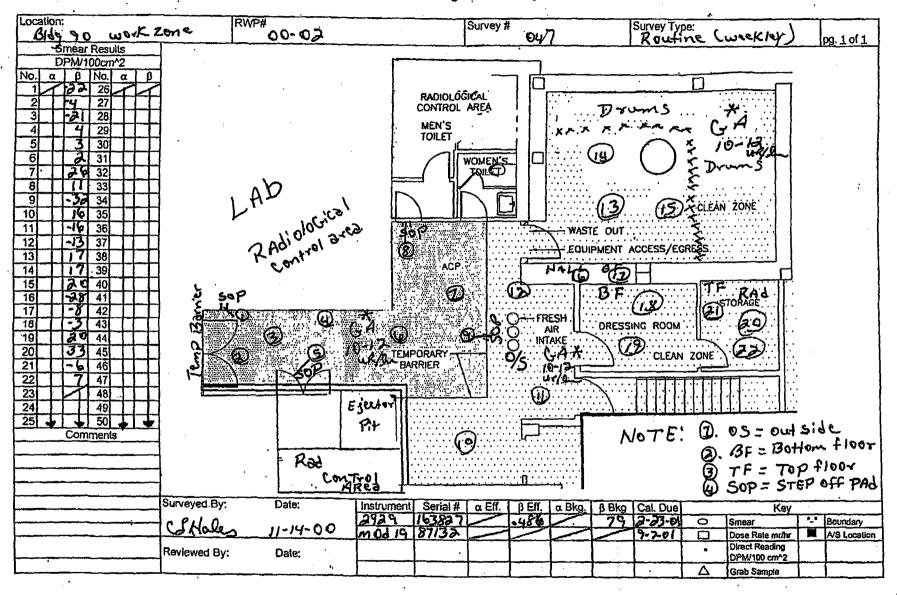
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- Pee Swevey - OP-001-02 Radiological Survey Sheet

Location:			· · · · · · · · · · · · · · · · · · ·					
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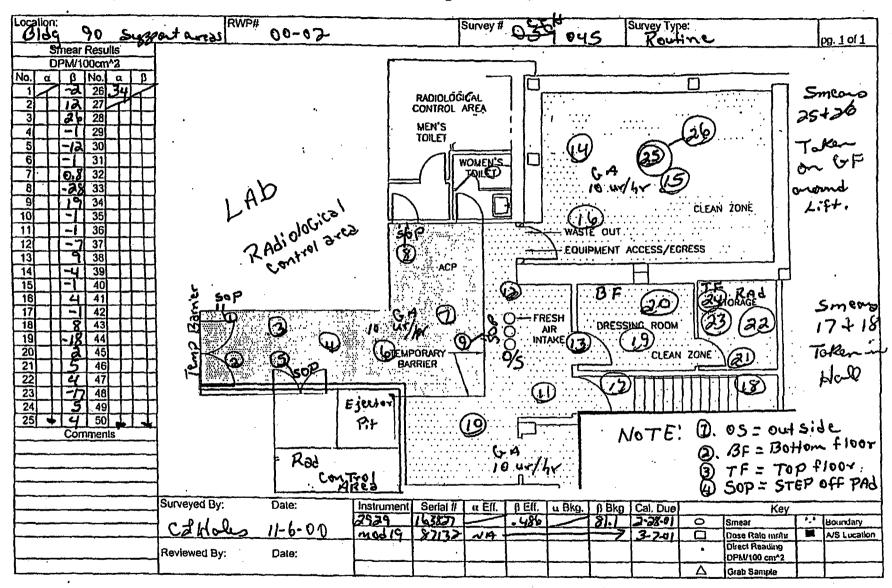
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21 1-16 46		#154		L4S				∧/a	te: c	45 =	counts		
22 -3 47 16	İ	4 call 15	, ,,,					•					
23 -27 48 16		# 134 150		s cho				.1 ~		· · · /	mad 19	' e /	avc.
23 -27 48 16 24 21 49 17 25 22 50 17 Comments		# 155	150	ets c	•		on 120	T 1	Courty	,) / C
25 1 2 3 50 1 1 (B)		155	172	8 cts			BKG	· =	10 UT/	hr			!
All counts 2 min (9)		#15 b	171					٠					;
All counts 2 min (9)	1											•	
(29)	*	156	173	s cts									
		•											!
Surveyed	Ву:	Date:		Serial #	α Eff.		α Bkg.	ß Bkg	Cal. Due		К	ev ·	
CTM	- 0-	11-8-00	2929 1	(3827		-486		79.9	12-25-01	0	Smear		Boundary
CAN	oxes.	11-9-00	mad 19	87/32-	NA		===	= 2	3-7-01		Dose Rate mr		A/S Location
Reviewed	By:	Date:								•	Direct Reading		
	······································									Δ	Grab Sample		···



	KZone RWP#	00-02	· · · · · · · · · · · · · · · · · · ·	Survey to	038 0°	46 s	urvey Typ	34~;c4 38:	ed Relea	se	xg. 1 of 1
Smear Results DPM/100cm^2 No. a	ද මිට්ලිල්ල්ල්ල්ල්ල්ල්ල්ල්ල්ල්ල්ල්ල්ල්ල්ල්ල	nels	世 # # # # # # # # # # # # # # # # # # #	1691859404938031206	とうとうとうとうとうとうとうとうとうとうとうとうとうとうとうというというというと	A CONTRACTOR SON	Bons))))))	ts =	中143 4 14 14 14 14 14 14 14 14 14 14 14 14 1	168197112 mo	3 2 6 44 14 3 3 44 3 3 4 3 5 4 3 4 3 5 4 3 5 4 3 5 4 3 5 4 3 5 4 3 5 6 5 6 5 6 5 6 5 6 5 6 5 6 6 6 6 6 6
	Surveyed By:	Date:		rial # (x Eff.	BEIL a BI	kg. Bkg	Cal. Due	0	Key Smear		Boundary
	CSHoles	11-7-90	med 19 87	132 NA			3-7-01		Dose Rate mr/fw		A/S Location
	Reviewed By:	Date:						•	Direct Reading DPW100 cm^2		
]							Δ	Grab Sample		





Location: BH9 90 work	Zore RWP#	00-0Z	Survey #	038 04	Survey Type:	10000	
Simear Results DPM/100cm/2 No. a No. a B	ට පමල මග ම ලමල ම පමල ම න	.	181 cts 150 cts 150 cts 150 cts 160 cts 160 cts 160 cts 160 cts 160 cts 160 cts 160 cts 160 cts 160 cts 160 cts		Note: Cts		1 of 1
·	1	Date: Instrumer 2929 mod 19	163827	β Elf. α Bkg.		Key Smear - Bou	
		7-3-00 mod 19	87132 ~4		3-7-01	Dose Rate nu/hr A/S Direct Reading DPM/100 cm^2 Grab Sample	Location

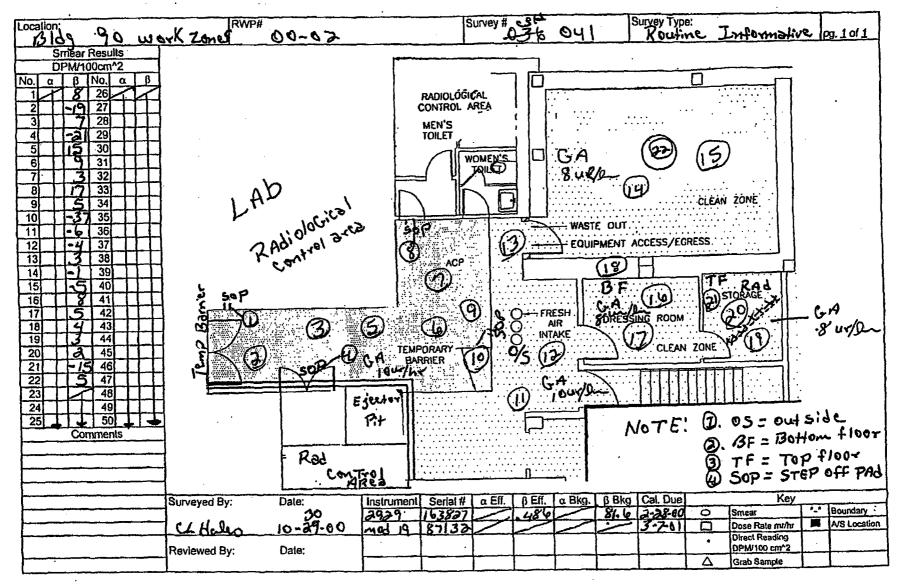
	·							·	•
Location: Bldg 90 war	RWP#			Survey#	037	ا 👡 ا	Survey Typa: R <s++:c< td=""><td></td><td></td></s++:c<>		
Bldg 90 War	(zone)	00-02			0.57	043	Ke stric	hd Release	pg. 1 of 1
Smear Results						•			
DPW100cm^2	Smean	r S ;							Į
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1 19 26 7-33		i .	_			0 1		#	8, 042
2 35 27	D Barre	ls # 11	19	CfS	•	<u>කි</u> වා. ඇ	ndelo	#122	
3 3 28	-			cts o	(2 1).		#123	P. C+3
4 3 3 29	a	·			7			123	26 8+5
5 -1 30	3	# 1	14 39	cts	· ·	22).			1
6 22 31					(23)		4124	13 045
7 9.2 32	Θ		' 1						77 63.6
8 5 33	9 G	#11	511	CFS	ζ	25V.		124	37 CHS
9 -5 34	•			_		6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		#125 125	22 45
10 21 35	©		5 22		}			175	-32 045
11 - 6 36		世(1	6 8'.	2 cts	(<i>26</i>).		(0)	70
12 15 37	9	4.	16 5	્ર મુડ					
13 3 38	(2)	#1							·
14 -4 39	<u> </u>	F 13	17 -5	6+5	•]
15 9 40	9		آھ (أ	U15	•	•			Ì
16 -0.8 41	(9)	•	<i>-</i>			:			
17 18 42	(ii)	* # 1	18 - 6	643					
18 -5 43		1	18 15	cto cto	5 .				
19 -2 44	(2)	, ₁₁ ,		U+:		•			
20 8 45	G)	#,	19 3	CT.	•			1	
20 8 45 21 6 46	6	·	119 -4	C.F.	S	1/8	46; C1	ls = counts	
22 24 47	(A)	٠, ١				, ,		1	
22 24 47 23 13 48	·(G)	#	120 9	ct					
24 37 49			20 -01	8 64.	s : C	contact	readin	= 10 ur/la.	
25 1 2 50	we .					AVE	21/c	J 10 11×10.	
Comments	(D)	**/	21 18	c+	•	5 0 NG	, DAG	= 10 0011200	
All comes 2mm	මිශිට්ලි රිට්ට්රිට්ට්රිට්ට්රිට්	j	21 -5	6+	·\$			•	
	9	.							
	(9)	, Table 1	122 -2	c+	כ			•	
		1	· · · · · · · · · · · · · · · · · · ·						
	Surveyed By:	Date:	Instrument Ser			Bkg. Bkg	Cal. Due	Key	
	c 5 Hole	. 1 . 2	2929 1638	27	-486	77.9	2-28-0	O Smear ,	"-" Boundary
	() Nale	11-2-00	MO919 871	32- NA		= = ≥	3-7-6	Dose Rate mr/hr	AVS Location
Ì	Reviewed By:	Dale:				1	1	Direct Reading DPM/100 cm^2	
	Trestenen by.	vale.					 -	△ Grab Sample	
	J		<u> </u>				<u> </u>	TO TOTAD SAMPLE	

			· · · · · · · · · · · · · · · · · · ·						·	
Location: Bldg 90 work	TA-P RWP#	20-00		Survey #	226	.042	Survey ly	pe:	Rilease	20 1011
Smear Results	ZONC C	0-02			200	<u> </u>	1 UZSU	10108	1/6/16976	pg. 1 of 1
DPM/100cm^2	Smears	•	·							
Νο. α β Νο. α β	O. Banel		207 (د +ر		•		•		
1 43 26			~ ~ ~ ~ ~							
2 1.4 27	惑	103	162	C+2				•		
3 10 28 7 29	<u>ම</u> ග්ර	#104	170	ets					•	1
5 21 30	(4)	104	167	2+5						
6 11 31	60	#105	181	c+s			,	•		
7 7 32 8 -5 33	0	105		じもら						<u> </u>
8 -5 33										
10 -29 35	©	#10%	179	cts	;					
11 - 6 36	②	d Di	154	c+5						
12 13 37	9	#107	155	C+3						
13 -15 38 14 -34 39	@	107	136	<i>و</i> +٥						·
15 /2 40		#108	155	C+5						
16 -4 41	W W		, .	CHS						
17 - 9,6 42 18 9 43		108	173		Ý					
19 16 44	3	#10°9	146	0.45						
20 10 45	(9)	109	128	ets						
21 46	ඉතු වනලට මල	#/10	172	CHS						
22 47 23 48 48 48 48 48 48 48 4	- G	110	. 157	cts						
24 49	lä	#111	160	C+S			late · c.	45 - C	ace to	
25 4 50 4			169			//	0/01.0			I
Comments All Counts	(8)			c.t.s		cont	met v	esgin	bon/w p	19
counted 2 min	\mathbf{Q}	#112	176	८स्ट		<u> </u>	BKG.	BKG	ounts s w/mod = 10ur/1	4
	20	112	151	CAS						
		·	1,127			Di . 0.51	-10.75			
	Surveyed By:	Date:	Instrument Seria	1# α Eff.	β Eff.	z Bkg. β Bk	g Cal. Due	0	Key Smear	*-* Boundary
	CS Holes	16-7-00	mod 19 871	32 WA-	400		3-7-01	<u> </u>	Oose Rate mu/tu	A/S Location
		. .		***			-	•	Direct Reading	
	Reviewed By:	Date:			 -			Δ	DPM/100 cm^2 Grab Sample	
	<u> </u>				<u> </u>			<u> </u>	I Gren oguithis	





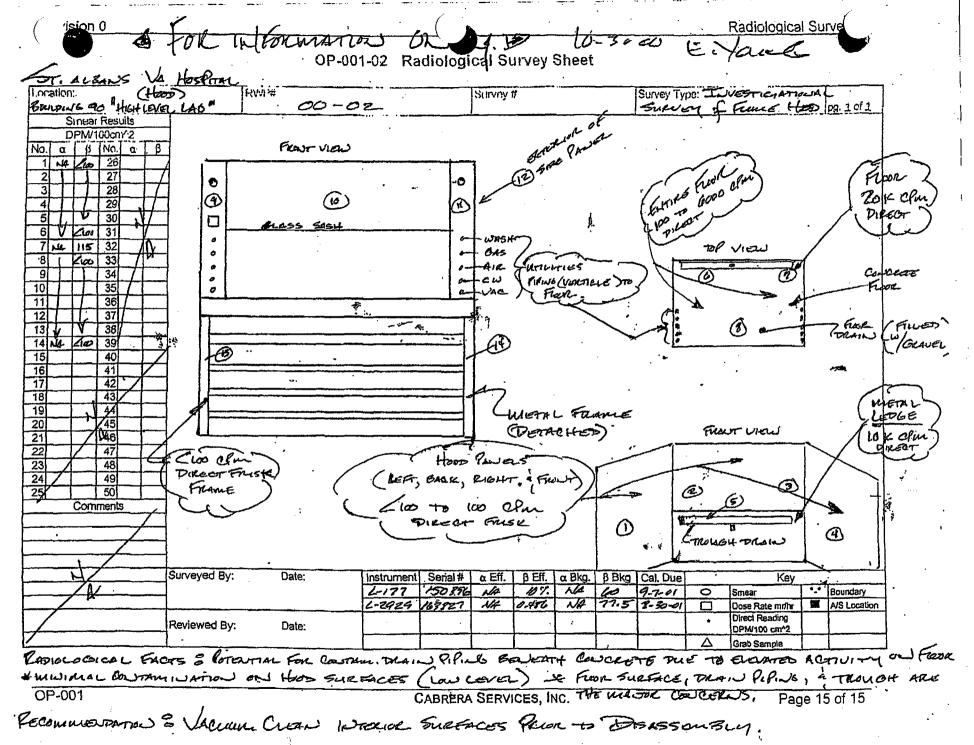
Bldg 90, work zone 00-02 Survey # Survey Type: Restricted Rectage	1 1
	pg. 1 of 1
Smear Results DPM/100cm^2 Smear S.	
DPM/100cm ² Smears:	
1 8 26	ļ
2 32 27 D Barrels # 92 168 cts 20 Bornels # 102	- 184 045
	, 163 cts
4 38 29 11	, , ,
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
93 197 C+S	
7 1 + 3 32 32 33 33 -10 ⑤ 世 94 171 1 と い は 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
8 33 -10 G	
100 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
11 0.5 36 1 0 #95 +76 c+5 163	Į
14 1-18 39 1 9) 7-96 170 CHS	ļ
15 9 40 #96 187 cts	i
16 13 41 11	1
17 -18 42 1 1 W 797 161 C+S	Ì
19 1-17 44 11 12 Note: (+5 =	
20 34 45 1 3	!
$\frac{21}{3}$	
18 143 ets Contact Reading Lake	w/modia
22 1 47 15 Contact Reading taken 499 169 cts Contact Reading taken 490 175 cts & BICO. BKG= 10 ur	1.
24 49 49 49 49 49 49 49 49 49 49 49 49 49	14r
All counts	
#101 140 cts	
Comments 100 143 cts 411 Ctouts 101 140 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts 4101 144 cts	
Surveyed By: Date: Instrument Serial # α Eff. β Eff. α Bkg. β Bkg Cal. Due Key	
7729 163827 .486 80.25 2-38-01 O Smear	•- Boundary
CL Notes 10-31-00 med 19 87/32 NA - 3-7-01 Dose Rate mintr	A/S Location
Reviewed By: Date: Direct Reading OPM/100 cm^2	
△ Grab Sample	



OP-001

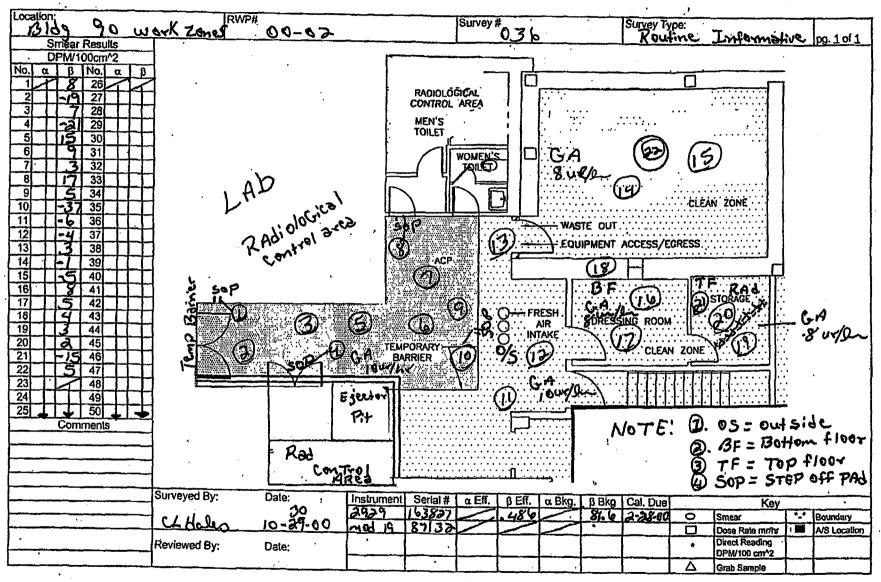
CABRERA SERVICES, INC.

Page 15 of 15



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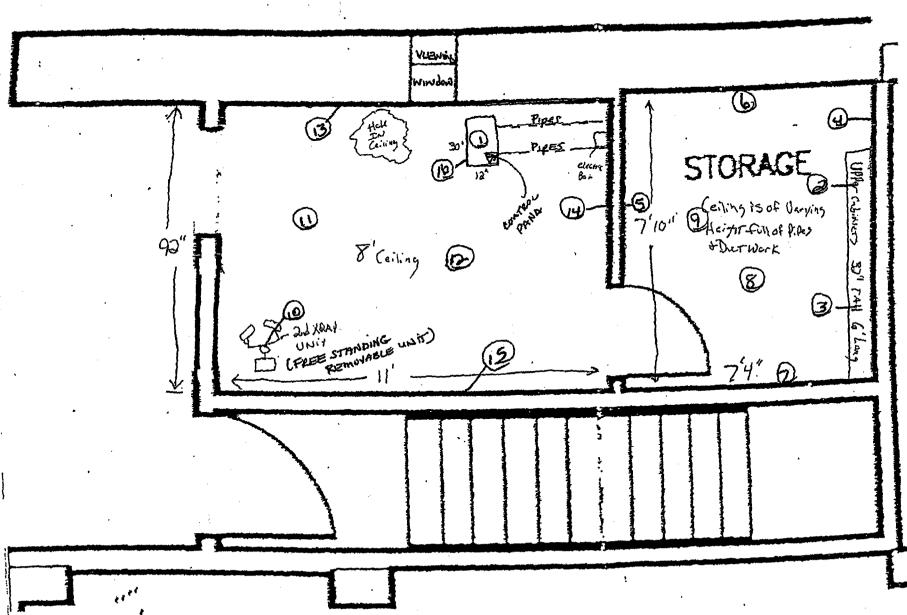
Location: Bldg 90 work	RWP#	00-02-		Survey# 038	Survey Type: Restricted	72010000	22 1 2 1
Smear Results	Lone	00-02-			I KESINCIA	. ICCIESSE	pg. 1 of 1
DPM/100cm^2	Smeans:						
Νο. α β Νο. α Β			. 142	counts			
1 26 26	(a) source		-				
2 -9 27 3 -2 28	(A)	# 83	172	.	•		
4 -3 29	(3)	# 84	165	1			
5 -17 30	1 (9)	# 84	160				
6 -5 31	(G)	# 85	147	ľ	•		
7 16 32 8 21 33		# 85	158	{	•		
8 2 33 9 35 34	9	# 8b	179				
10 5 35		# 8b # 8b					
11 -4 36	(8)	# 86	184	1			
12 -0.3 37	(9)	# 87	197				
14 6 39	(0)	# 87	168	1	•		
15 17 40	දී මගලා විශම්පමල මලා මාම්ථාම මාම	#88	159				
16 20 41 17 -7 42	1 %	# 88	163	i i			
18 -14 43		# 89	211	tock of	reading BKG	taken w	mod 19
19 44 .		# 07		Concres	, , , ,	•	
20 45	(4)	#89	169	# 87132	< BKG		
21 46 22 47 47 A	(5)	#90	180	27.52	BKG= 180	4-10-	
23 48		# 90	183	1	Dietori		•
24 49		# 91	156		•		
25 4 50 4		#91	159	<u> </u>			;
Comments All Counts	4 (2)	71	,	•			
2mm	1						
	1					•	
	Surveyed By:	Date: In	strument Serial	# α Eff. β Eff. α Bkg. β Bi	kg Cal. Due	Key	
	1		1929 16380	1 .486 8	3-25-00 O	Smear	Boundary
	Ch. Males	10-30-00	_/ _/	4-1-1-		Direct Reading	A/S Location
	Reviewed By:	Date:				Direct Reading DPM/100 cm^2	
]				/ 4	Grab Sample	



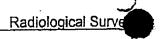


Location:		RWP#		- 10	Survey#			10	Survey Ty	De:		 -	
X-Ray Contro	Rm	60-02		1	ouivey #	03	5	ľ	Survey Ty	mati	ر و		pg. 1 of 2
Smear Results		•		·									
DPM/100cm^2	Smes	×5:				_							
Νο. α β Νο. α β	0 7	's contral pa	nél - 1	176 CA	the street	•							.]
2 1-14 27	0, 34	J (3/4) 4. /	۸. ۱	_ , ~	7/ c.:	tro cat	•						. 1
3 - 2 28	(2). R	econd rooms	L alliened										
4 2 29	3 .	11 11	ι (- 15	e c	صلا.							İ
5 -4 30 6 34 31			•										ł
6 34 31 7 7 32 1	છે.	South wall		15	9 c	ゃ							
8 -21 33	(3)	noth wall		سر ,	0-								į
9 15 34 10 13 35				17	4 4	0							1
11 -21 36	. —	East wall		19	1 0	t_o							:]
12 13 37	② , .	west well			1 0	-		•			•		
13 10 38		Record Room	Class	•									
14 2 39 15 -5 40		KEGET KNOW	ALARA	13	7 63	*					•		j
16 12 41	9 .	17 46	l e	17	2 c	ታ 。		!					
17 42	10	portable X-R) .	• •		•		. /	, 		_		
18 43 19 44 1	i		.04	175	10 C	2)	٠,	-/Y	OTE	•	ے و و		į
20 45		Front Floor	.) (失	_		•			04	120	ment
21 46	(D)	10 11						-			77110	3 Ch	ment
22 47 23 48	(a)	woill # 1			৫%						•		
23 48 49		1 1 m		148	وعلى	,							
25 50 50	(1	wall # 2		159	675	9			•				
Comments	(A) (D) (B) (B) (B) (B) (B) (B) (B) (B) (B) (B	woll # 3	•	153	3	9					•		
2 200 Cat 5	(P)	control por	nel		9 00								
2 min Court	(A)	— • • • • • • • • • • • • • • • • • • •			, ,								
				v.				- 5			•		
	Surveyed By:	Date:	Instrument		α Eff.		α Bkg.		Cal. Due		Кеу		
	C 9 Hol	es 10-27.00	2929	163827		.486		78.25	2-28-01	0	Smear		Boundary
			 							<u> </u>	Dose Rate mr/hr Direct Reading		A/S Location
	Reviewed By	: Date:									DPM/100 cm^2		
	<u> </u>		1	<u> </u>						\triangle	Grab Sample		

X-RAY CONTROL ROOM



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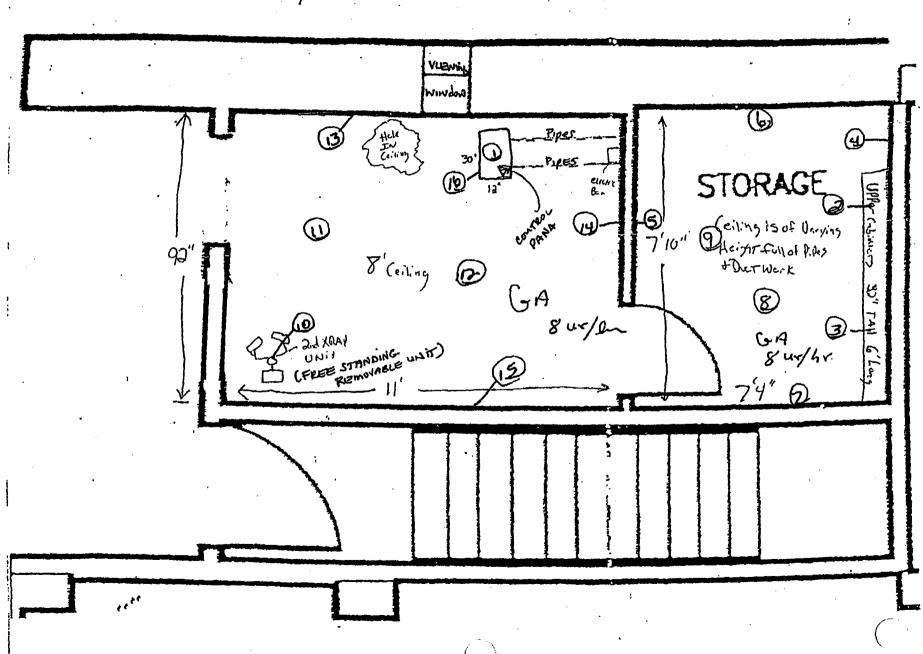


Location: Bld9 90 Lab	RWP#	-	Survey#	034	Survey T	ype: rmotive	·	pg. 1 of 1
Smear Results DPM/100cm^2 No. α β No. α β	Smeans Take	en inside	وضليح		•	•		
1 29 26	1. Court reson	393			•		. •	
3 16 28 4 10 29 5 7 30	a , " "	- 629	્ હેન્દ્રગ	•				
6 38 31 7 39 32	3 Low leve	. —	()					
8 63 33 9 -2 34 10 39 35	(1) Iso 540	- 167 - 164	cto cto					
11 298 36 12 12 37 13 86 38	(b) 11 11	- 194	C.Fo		• · · · · · · · · · · · · · · · · · · ·			
14 265 39 15 17 40	① (-196	にち		٠,			
16 212 41 17 42 18 43	D vent in A	- 219 421 - 600	C TES					
19 44 1 20 45 1 21 46 1 46 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	10 High leve		ريدى		•			
22 47 23 48	High Sevel	200 - 447 New - 278	ولئ وجاري				•	
24 49 50 Comments	13 High lard	Hall - 357	とき				;•	•
All courts	(15) 11 11 (16) 2001 Deve	11 324 2 - 360	くち	•				
	Surveyed By: Date:	Instrument	Serial # α Eff.	β Eff. α Bkg.		е	Key	
	C.L. Ables 10-2	97-00 2929 16	3837	.486	78.75 2-28-0			Boundary A/S Location
	Reviewed By: Date:					Dire	ect Reading M/100 cm^2	10 2002
	noncincu by. Date.	 -			1		b Sample	1

<u></u>		,					·			 :_	·····
Location: X-Ray Combo	Rm RWP# 00	7-03-	Su	rvey#	当品	ہ م	urvey Typ Lnfo n	e; nativ	افي د		g. 1 of 1
Smear Results					Y_		<u></u>		<u></u>		
DPM/100cm^2	Smezrs:			_							{
Νο. α β Νο. α β	1. It's contral	2 panel - 1	76 can	光							
2 14 27 3 -8 28	Q. Record ~	som cabinet	- 171	(८३७	:			•			
4 2 29	3, 1,	i ii	- 156	صلاع و							į
5 -4 30 · · · · · · · · · · · · · · · · · ·		. 00	. در د	4.				•			Į.
7 - 32 33 33	a. South		15	ets f							:
9 15 34	3 note		154	ري ا					-		İ
10 13 35 11 31 36	6 East 2		191	cto				,			:
12 13 37 13 10 38	D. west 1		151	وين				1			
14 2 39	8. Record A	som floor	137	ر خی				:			
15 -5 40 16 12 41	9	4C (1	172	ょっち		:					
17 42 43	10 portable	X-Ron				λ/.	OTE	, (500		
19 44	@ 7-mont 75	Doen J		دهی	••	ŅY.	9 1 6	· c			_
20 45 46 46	, ,			cto			•		Atta	3CH	ment
22 47			130						. •		
23 48 49	(1) work	*1	148	cto					,		
25 50 50	(ति) भागा	# み	159								
Comments	(15) woll:	#3	153						•		
2 min Court	(1) contra	# 2 # 3 I pond	160	30							
Time.		•				•	•				
	Surveyed By: Date:	Instrument	Serial #	α Eff. β Eff.		β Bkg	Cal. Due		Key		
	c. I Holes 10-2.	2929	163827	.48	9		2-28-01		Smear		Boundary
	CIHOLES 10-3.	7.00 mod 19	87/3>	WA -	1		3-7-01		Dose Rate mr/hr Direct Reading	_=	A/S Location
	Reviewed By: Date:				1			•	DPM/100 cm^2		
	<u>, , , , , , , , , , , , , , , , , , , </u>		1					Δ_	Grab Sample		

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X-RAY CONTROL ROOM





l ocation:	RWP#	· · · · · · · · · · · · · · · · · · ·	16	Survey #	741	037		Survey Typ			 -	
Location: Bldg 90 Lab	~ 0 - 0 ~ ·		٦	- 0	7 6		314	Infor	naži v	٤) _P	g. 1 of 1
Smear Results		•				1		<u> </u>	·· •			
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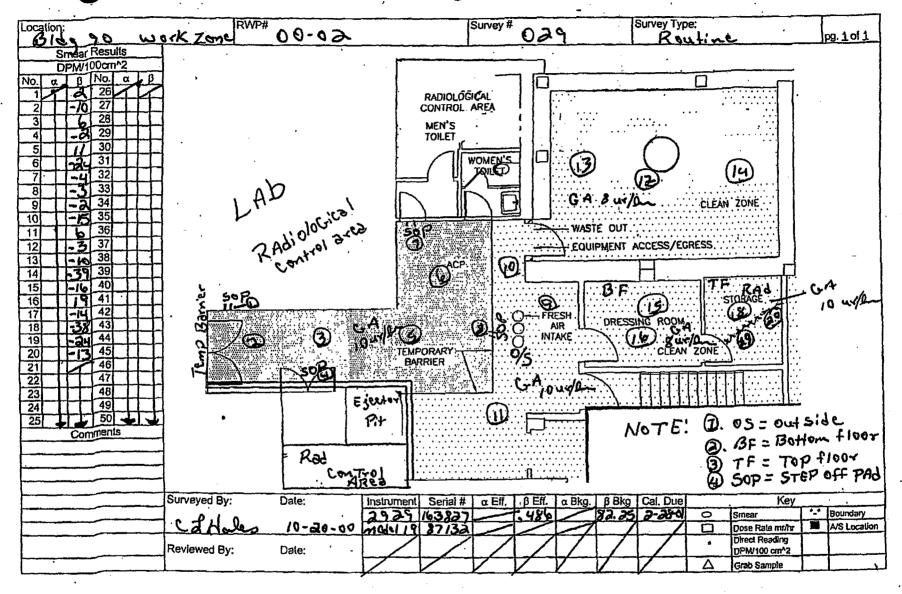
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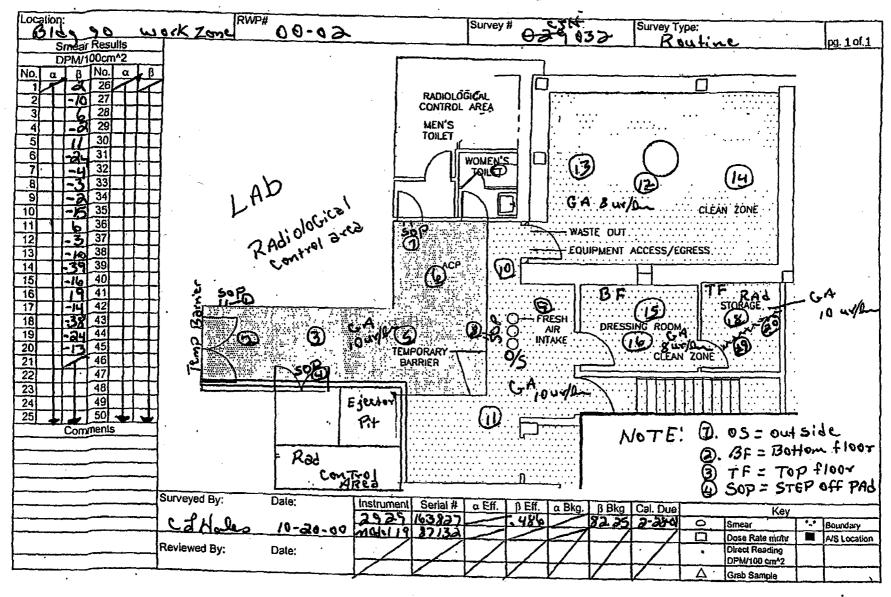


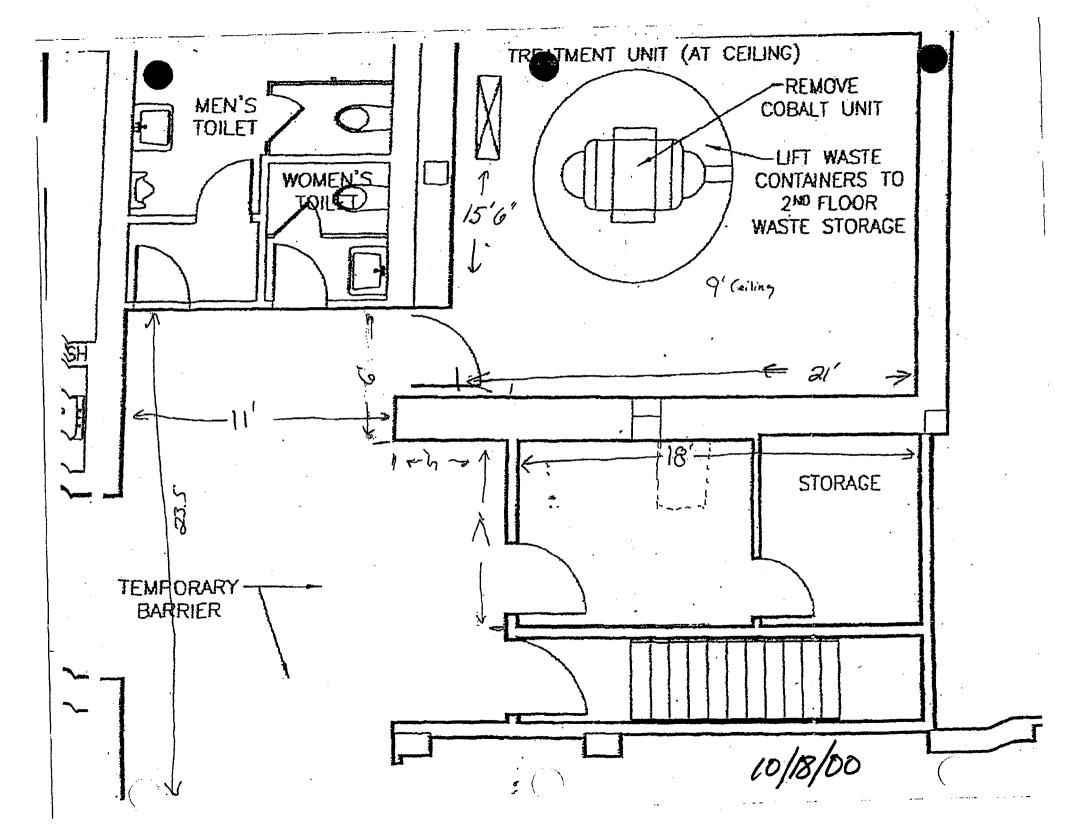
Location: Bldg 90 work	Zone RWP	00-02		Survey# 47	035	Survey Type: Restricted	Ke/ease	pg. <u>1</u> of <u>1</u>
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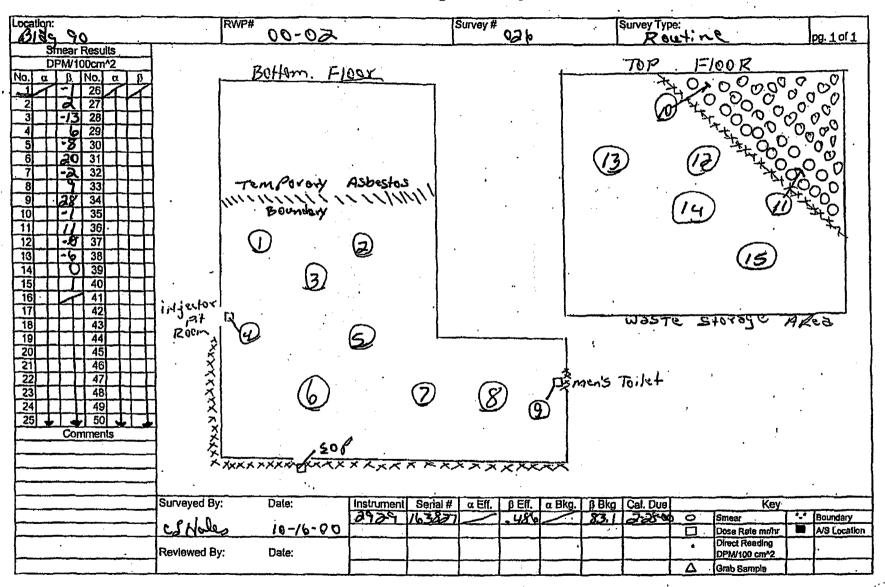






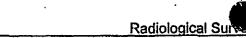
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Location: Blas 90	RWP# 00-02	Survey # Strong Type: Par 039 Rout: ~ pg. 1 of 1
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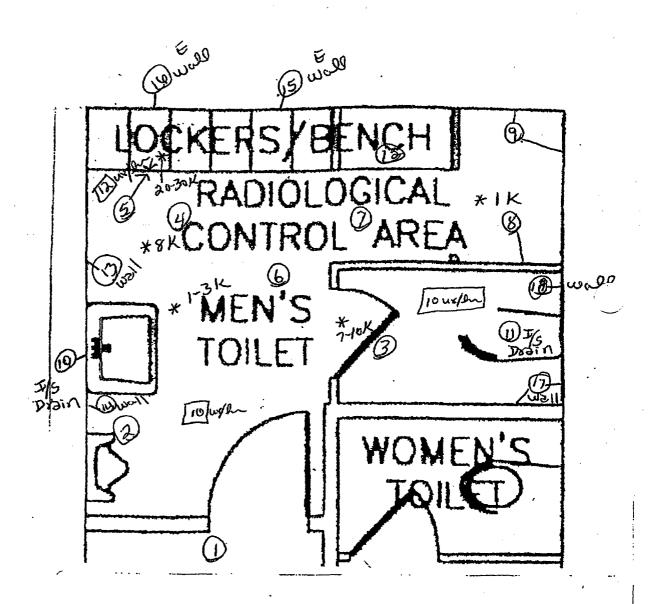
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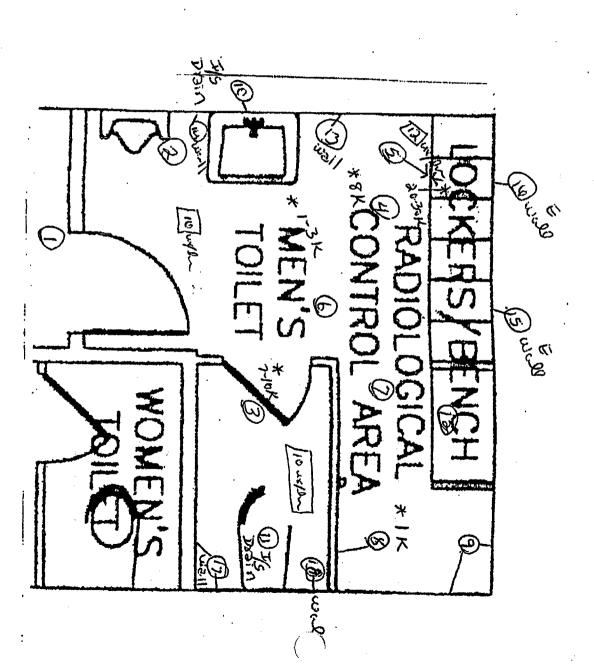
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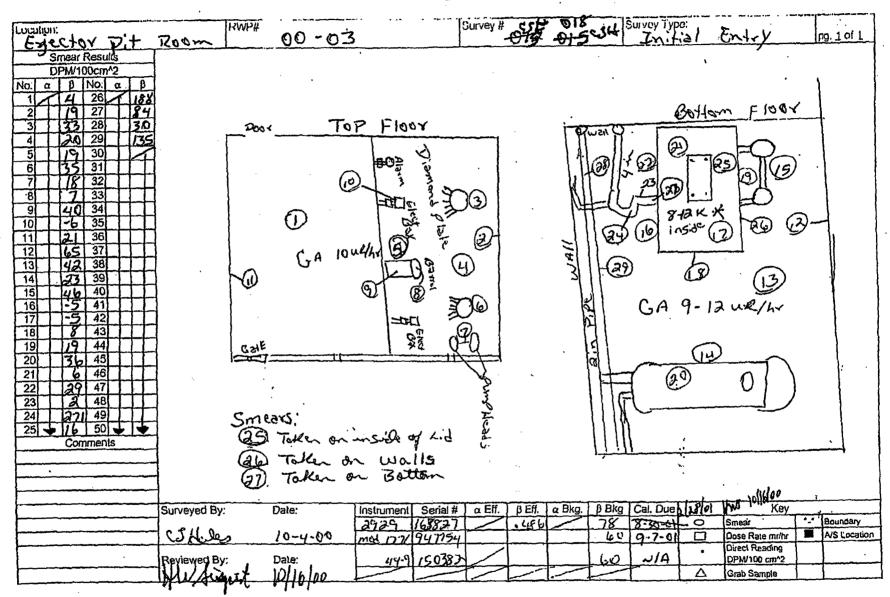
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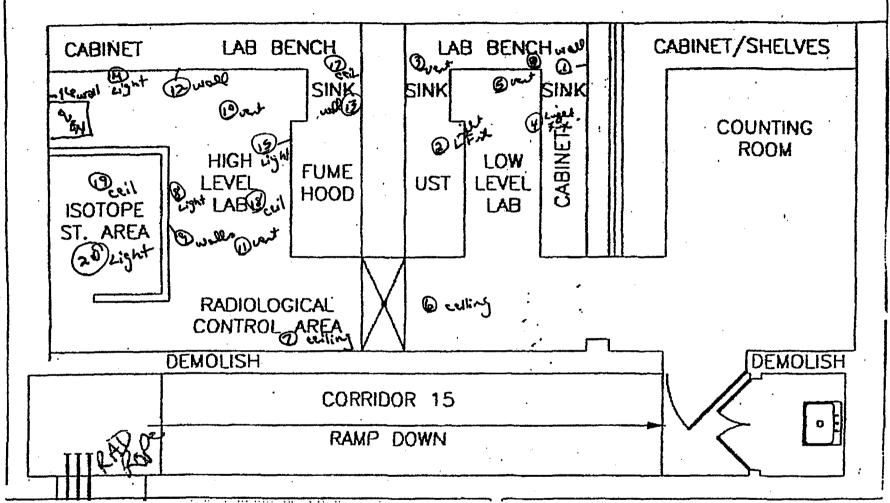
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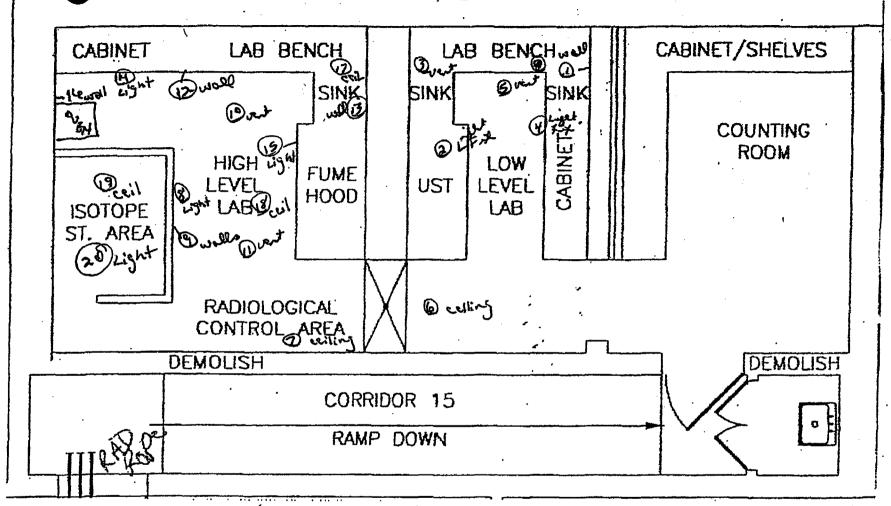
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Simear Results DPM/100cm/2 No. α β No. α β 1 35 26 2 190 27 3 17 28 4 171 29 5 35 30 6 98 31 7 88 32 8 71 33 9 19 34 10 35 11 13 36 12 5 37 13 49 38 14 134 39 15 -12 40 16 27 41 17 22 42 18 7 43 19 8 44 20 4 45 21 46 22 47 23 48 24 49 25 7 50 7 7 Comments All Smears Counted Amins	Smedrs: Devel Lab was Light for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent for Nent f	Hure 347 cpm Hure 347 cpm Hure 348 cpm Hue 338 cpm 196 cpm 189 cpm 189 cpm 180 cpm 170 cpm 170 cpm 170 cpm 180 cpm 170 cpm 180 cpm 180 cpm 180 cpm 180 cpm 180 cpm 180 cpm 180 cpm 180 cpm 180 cpm 180 cpm 180 cpm 180 cpm		see page 2 Hackment Key Smear Boundary
	Reviewed By: Date:			DPM/100 cm^2 · Grab Sample

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46' X8' HAIL TO GARGE

Location: 616990 wax	K Zone RWP# 00-02	Survey# 9 c 414	Survey Type: pg. 1 of 1
Sinear Results DPM/100cm^2 No. a B No. a B	Smears:	County (3) I	Carry Carry
1 41 26 2 28 27 3 26 28	D. Iron support	19 com (10) (2), Tr.	enstormer 394 eg and blug enstormer 316 cg and 141400 roustormer 402 cg and 800 unit 164 cg and
4 66 29 5 83 30	· 3 / ' ' '	216 cpm (23) .T.	800 unit 164 com
6 594 31 7 73 32 8 91 33	© Iron support	23/ com (55. 4	End of LIST
9 27 34 10 39 35 11 15 36	1 Banels #4 I/s	222 cpm 240 com	
12	(B) # 4 1/5 (D) # 4 70015ide (E) # 4 30110m/sid	178 600	
15 6 40 16 34 41 17 25 42	Manuel #5 I/s	166 epan 165 epan	
18 3 43 19 37 44 20 1/9 45	#5 T/S #5 T+S #5 B+S #5 B+S #6 T/S #6 T/S #6 T/S #6 B/S #6 B/S	198 6224 141	
21 249 46 22 169 47 23 258 48	(3) Banel # 6 I/s # 1/s	213 cpm	
24 3 49 25 44 50 Comments	#6 I/S	176 cpm	
d main Count	1 1/4 2/00/06/ 1/4/14-1	415 com 4	
for swears	Surveyed By: Date: Instr	ument Serial # α Eff. β Eff. α Bkg. β	Bkg Cal. Due Key
	CL. Noles 9-27-00	486 163837 .486	Dose Rate mr/hr A/S Location
	Reviewed By: Date:		Direct Reading DPM/100 cm²2 △ Grab Sample

<u> </u>	IRWP#	Survey #	Survey Type:	
Blog 90 wor	K Zone 00-02	00 <i>8</i>	Daily	pg. 1 of 1
Smear Results				
DPM/100cm^2				1
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2 -18 27	•		•	
3 -4 28		•		Į.
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5 19 30 6 21 31	Esc Ext		mears: 2 minicount	
7 16 32	1	Carrigar D.	170 Except Hay (B).	208 cpm
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9 5 34	1 1 The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of t			213 com
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14 39	GA ≥ 10uR/lan			
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19 44 1			Respirators \	
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Comments	9 6 .	٧	159 % Com	
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	Surveyed By: Date: Instrumer	nt Serial# α Eff. β Eff. α Bkg.	ß Bkg Cal. Due alphot tolkion k	(ey
	7 2030	163827 486	XUDS 3:30-0 17 C Silles	*-* Boundary
	CL. Males 9-27-00 models		14-7-0! ☐ Dose Rate m	
	Reviewed By: Date:		Direct Readin	
	the farit 10/16/00		△ Grab Sample	
<u></u>				

Location: Bldg 90	Survey # CSP Survey Type:	
Smear Results	LAB RWP# 00-03 Survey# 00-07 Survey Type: P9.1	of 1
DPM/100cm^2	1) Banel #1 Top + Side 102 Cpm (a) 1 1#4 Bottom + Side 109.5 Cpm (b) Banel # 2 Top + Side 103 Cpm (c) 4 # 2 Bottom + Side 107.5 Cpm	1
No. α β No. α β 1 54 26 1	Q 1 1# Bottom + side 109.5 com	- 1
2 69 27	3 1 0 # & Top & Side 102 6 2000	- 1
3 56 28 4 65 29 5 40 30	3. Bonel # 2 Top + Side 103 cpm Q. + # 2 Bottom+Side 107.5 cpm	.
5 40 30		
6 40 31 7 47 32	5. Rad waste # I/s (1) 95 com	
8 56 33	Q] I/S (1) 95 com	
9 56 34 10 33 35	0 1/5 (1) 96 cpm	J
11 46 36	1/5 (1) 95 cpm 1/5 (1) 96 cpm 1/5 (1) 96 cpm 1/5 (2) 103 cpm 1/5 (3) 103 cpm	ŀ
12 37 37 13 237 38	103 com	
14 1927 39	103 com 155 2 92 com	İ
15 255 40 16 327 41		
17 30/ 42	D. SOP #1 EZ 95 CPM 93.5 CPM 93.5 CPM 186 CPM 187 Vent I/S 186 CPM 187 Vent 197.5 CPM 197.5 CPM 197.5 CPM 197.5 CPM 197.5 CPM 197.5 CPM 197.5 CPM 197.5 CPM 197.5 CPM 197.5 CPM 197.5 CPM	
18 304 43 19 662 44	(3) sep #2 52 93.5 com	
20 1951 45	(3) vent I/s (4) 136 com (4) 4 9/s 283.5 com	- }
21 46 47	(1) (1) (2) (2) (3) (3) (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	
23 48	B. Light fatture 491.5 cpm (b). Iron supports 234.5 cpm	1
24 49 50	16. Iron Supports 834.5 com	
Comments	10. Iran supports 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10. 11 10.	
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	397.5 com	
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	Date: q Instrument Serial # α Eff. β Eff. α Bkg. β Bkg Cal. Due Key	
	Cuts J. Hala 2929 163827 S186 486 76.55 8-34-3 0 Smear - Bounda	cation
	Reviewed By: Date:	
	Whighiet 6/16/0e DPW100 cm^2	



Location: BNG 90, LAB	RWP#	0-03	Survey #	006 :	Survey Type: Inform	a tived early	pg. 1 of 1
Smear Results DPM/100cm^2			······································	**************************************			
No. α β No. α β 1 2 26 3	5 mers t	aken inside	pipe in	n hole" in	206.		
3 28 3	D. 10863/	amin courts	= 5432 7	net counts		ı	ļ
5) 30)]	2. a1264.	amin count	= 11015 D0 1-5 = 1063a	em/100 cm	- ·s	·	
7) 32 ((8) 33)	•	•	= 2171	6 Dpm 1100	cmz		
9 / 34 / (10 / 35) 11 / 36 / /			·		: •		
12 37 5 1 13 () 38 ((:			•	•	
14) / 39) (15 () 40 () 16) / 41 ()							
17 / \ \ 42 / \ \ 18 / \ \ 43 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		•				. •	·
19					•.		
22 \ (47 \)							
24 \ 49 \ 50 \ 50		·		•			
Comments						•	·
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	Surveyed By: Da	1	Serial # α Eff.	β Eff. α Bkg. β Bkg		Key	· ·
	CJ. Holes 9	-25-00 2929	163827	78	8-30-01 0	Smear *** Dose Rate mr/hr	Boundary A/S Location
	Reviewed By: Da					Direct Reading DPM/100 cm^2	TVO LOCADOII
						Grab Sample	

Location:	RWP#	00-03		Sur	vey#		Survey	ype:	HINE REST		g. 1 of 1
BNG 90, LAB Smear Results		00.03		L	000		Y	4013015	34100	1Ľ	9. 1.01 1
DPM/100cm^2											
Νο. α β Νο. α β	5 mers	1-V-	٠ - ٣٠١ -	0'04	:- h	ele '		,			
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3 5 28 5	D. 10863	3/amin	courts	× 543	a nete	etruo.			•		
4 (29 /				- 11019	DPmi	١٥٥ ك	m2			•	
5) 30)	a alak	14/2min	- Caul	<u> </u>			ع ا				
7 7 32 (9	CO04(12	16	1052 7	er (00	~~13				•
8 () 33 (•			= 2	1716 D	pm/11	00 Cm-				
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<u> </u>	Surveyed By:	Date:			Eff. β Eff.	α Bkg.	β Bkg Cal. D		Key		
	CJ. Hales	9-25-00	2929 1	63827	-486		78 8-30-	빗음	Smear Dose Rate mr/hr		Boundary A/S Location
			 	-A	/ /	1-/1	144 MO		Direct Reading		cocaudi
	Reviewed By:	Date:		/-	/	///	/ MIRIO	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ 	DPM/100 cm ² 2 Grab Sample		
<u> </u>	HV freepiet	10/16/00	<u> </u>			<u>vv</u>			Grap gampie		

OP-001-02 Radio Cal Survey Sheet

Location: RWP# _ Survey Type:	
Lah Bldg 90 (TRE) 00-03 005 Informative	pg. 1 of 1
Smear Results	= = ; actva
No. a B No. a B Survey is for pipe under hole in Lab.	0 (-10:20)
No. a B No. a B Jack of Sige onder hole in Lab.	of rust
1 1 20 1	Particle
- - - - - - - - - - - - - - - - -	V
1 1 1 1 29 1 1 Read 1 121194 /2min = 60597 cpm on 6027	I net com from
$\frac{3}{4}$ $\frac{28}{29}$ Read 1 121194 /2 min = 60597 cpm on 6027 $\frac{5}{30}$ Read 2 39563 / 1 min = 39563 (cpm on $\frac{6027}{390}$	37 net cam Pipe
6 1 1 31 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Di Ma Dilal-2mm
	thick.
8 33 Read 1 = 224892 dpm = 0.1013 uc? (contact)	,
Read D = 11/100 dans - molegici (1. Reading	\
)
11 36 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
14 1 39 1 1 CStimated activity in cast iron pipe it uniform	-U/
Estimated activity in cast iron sipe if uniform 15 40 contaminated, take average of 0.1 + 0.0 b = .08 uci/	com 2
16 41 41 1	
17 42 1 2 2 3 3 42 42 42 42 4	
Then based on a 3 inch ID Pipe have	į
58 usi Per running fost of Pipe. Assume	Pipe
58 uci Per running foot of Pipe. Assume runs /3 full have - 20 uci per running fe	of of
. 	
23 48 7.60.	1
24 149 Direct Gamma reading in 1410 111/1210/1110 11	1.1.1
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Comments $19 = 90 - 110 \text{ uz/o}$ $Easy spect # 09981135 reading in hole yeilded$	
Easy spect # 0998/135 reading in hole yeilded	33-42 ur/l
	Key , .
Cut Hole 9-75-00 2001 163675 10008 650 34101 0 Smear	*-*. Boundary
Cuts Moles 9-25-00 43-89 17 1380 2078 NIA Dose Rate	
Reviewed By: Date:	·
Herbigust 9/25/00 Diminus	de l

Location: Lab Bldg 90 (RR) RWP# SH Survey # Survey Type: Ppg. 1 of Survey Type: Survey Type: Description: Survey Type: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: Description: De	. [
Smear Results	actual
No. a B No. a B Survey is for Dipe under hole in Lab.	of rist
1 1 26 7 7	particles
2 27 +BKG 652/2mm = 326 CPm	
1 1 128 Read 1 121194 /2min = 60597 com on 60271 net con	r from pipe
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Direct Gamma reading in hole w/kudlum model Comments 19 = 90-110 uk/en	
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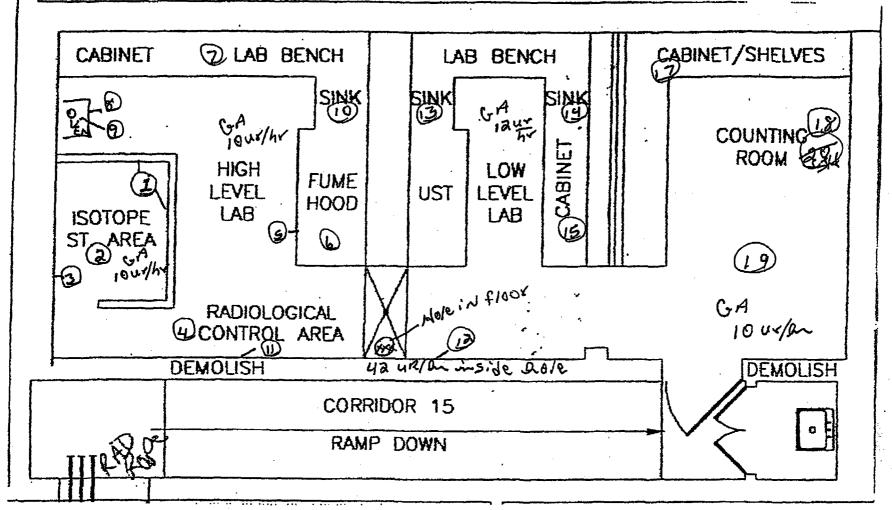
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OP-001-02 Radio Cal Survey Sheet

Location: BIDS 90	Lab RWP# CFB 00-02 Survey# 003 Survey Type: pg. 1	of 1
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	Surveyed By: Date: Instrument Serial # \alpha Eff. \beta Bkg. \beta Bkg. \beta Bkg. \text{Cal. Due} \text{ Key} \\ \tag{29.29} \langle \langle \langle \langle \text{Bound} \\ \text{Reviewed By: Date: Instrument Serial # \alpha Eff. \beta Bkg. \beta Bkg. \beta Bkg. \text{Cal. Due} \text{ Sinear \text{** Bound} \text{ Bound} \\ \text{Direct Reading DPM/100 cm*2} \\ \text{Direct Reading DPM/100 cm*2} \\ \text{Description A Grab Sample} \text{ Grab Sample}	

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Location: ST Albans LAB Blog 90 00-01 Survey# Survey Type: Smear Results DPM/100cm/2 No. a B No. a B O. Rean Room walls Q Cpm	pg. 1 of #
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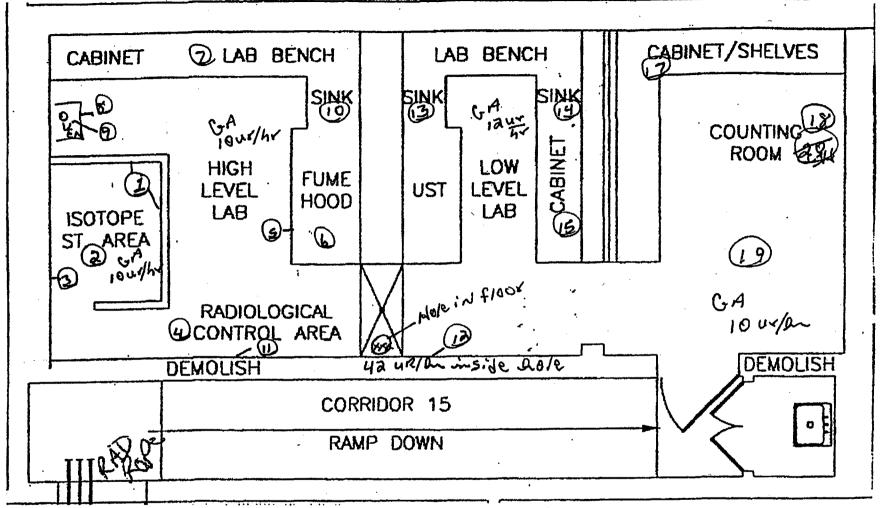
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D. Anside over

- D. walls
- Wall
- **3**.
- Fune Hood Hood floor outside over

Location:	RWP#	Survey#	Survey Type:		
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for Beta/Cammi		Instrument Serial# α Eff. β Eff. α Bkg. β Bkg	7:30-00 O	Key Smear	*-* Boundary
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Location: ST Albans A	AB BN	RWP#	00-01		Survey	00 2	Survey	Type:	entry	,	pg. 1 of 2
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Smeans Taken

D. eluside over

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