1 of 4

Radioactive Waste Shipments to Hanford Retrievable Storage from the General Electric Vallecitos Nuclear Center, Pleasanton, California

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EXECUTIVE SUMMARY

During the next two decades the transuranic (TRU) wastes now stored in the burial trenches and storage facilities at the Hanford Site are to be retrieved, processed at the Waste Receiving and Processing Facility, and shipped to the Waste Isolation Pilot Plant near Carlsbad, New Mexico for final disposal. Approximately 3.8% of the TRU waste to be retrieved for shipment to WIPP was generated at the General Electric (GE) Vallecitos Nuclear Center (VNC) in Pleasanton, California and shipped to the Hanford Site for storage. The purpose of this report is to characterize these radioactive solid wastes using process knowledge, existing records, and oral history interviews.

Since March 1956, the VNC has been owned and operated by GE as a nuclear reactor research and development facility. There are four reactors and five main reactor program support buildings onsite. Only one small nuclear test reactor remains operational while the other three test reactors have been shut down. The waste that was shipped to the Hanford Site was generated almost exclusively from the activities in Building 102, specifically those of the Plutonium Fuels Development Laboratory and the Plutonium Analytical Laboratory. Section 2.0 provides further details of the VNC physical plant, facility operations, facility history, and current status.

The solid radioactive wastes that were sent by VNC to the Hanford Site were associated with two U.S. Atomic Energy Commission/U.S. Department of Energy reactor programs — the Fast Ceramic Reactor (FCR) program, and the Fast Flux Test Reactor (FFTR) program.

These programs involved the fabrication and testing of fuel assemblies that utilized plutonium in an oxide form. The types and estimated quantities of waste resulting from these programs are discussed in detail in Section 3.0.

The packaging and handling of solid waste from the FCR and the FFTR programs varied considerably from each other. The waste generated by the FCR program was packaged into specially designed liners before being placed into shipping casks. The FFTR program wastes were packaged in large wooden boxes or 55-gal drums. A detailed discussion of the packaging and handling procedures used for the VNC radioactive wastes shipped to the Hanford Site is provided in Section 4.0.

Information on the radioactive wastes generated at VNC can be found in a number of existing documents and databases. The most important of these are the Solid Waste Information and Tracking System database and Solid Waste Burial Records. Facility personnel also provide excellent information about past waste generation and the procedures used to handle that waste. Section 5.0 was compiled using these sources to characterize the radioactive wastes, especially TRU wastes, generated at VNC.

Between 1974 and 1984, 262 containers of radioactive solid waste generated at VNC were shipped to the Hanford Site to be stored. These containers represent over 394,000 kg of waste occupying 708 m³ of space. Section 5.0 provides an in-depth look at this waste including the following:

- Weight and volume of the waste**
- Container types and numbers**
- Physical description of the waste**
- Radiological components**
- Hazardous constituents**
- Current storage/disposal locations.**

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LIST OF TERMS

AEC	U.S. Atomic Energy Commission (now DOE)
AFL	Advanced Fuels Laboratory
COPRECAL	coprecipitation and calcination
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EBR-2	Experimental Breeder Reactor-2
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESADA	Empire State Atomic Development Associates, Inc.
FCR	Fast Ceramic Reactor
FFTR	Fast Flux Test Reactor
FL	Plutonium Fuel Fabrication Laboratory
FRP	fiberglass reinforced polyester
GE	General Electric Company
GETR	General Electric Test Reactor
HLW	high-level waste
HVAC	heating, ventilation, and air conditioning
IAD	immediate action directive
LLW	low-level waste
LSA	low specific activity
MSDS	Material Safety Data Sheets
MW	mixed waste
NRC	U.S. Nuclear Regulatory Commission
NTR	nuclear test reactor
PAL	Plutonium Analytical Laboratory
PFDL	Plutonium Fuels Development Laboratory
R-SWIMS	Richland Solid Waste Information Management Systems
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RHO	Rockwell Hanford Operations
SDAR	Storage/Disposal Approval Record
SEFOR	South Eastern Fast Oxide Reactor
SNM	special nuclear material
SWBR	Solid Waste Burial Record
SWITS	Solid Waste Information and Tracking System
SWSDR	Solid Waste Storage and Disposal Record
TRU	transuranic
VBWR	Vallecitos Boiling Water Reactor
VESR	Vallecitos Experimental Superheat Reactor
VNC	Vallecitos Nuclear Center
WIPP	Waste Isolation Pilot Plant
WRAP	Waste Receiving and Processing Facility

RADIOACTIVE SHIPMENTS TO HANFORD RETRIEVABLE STORAGE FROM THE GENERAL ELECTRIC VALLECITOS NUCLEAR CENTER PLEASANTON, CALIFORNIA

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this report is to characterize, to the extent possible, the solid waste generated by the General Electric Company's (GE) Vallecitos Nuclear Center (VNC) and transported to the Hanford Site for storage. This characterization is of particular interest in the planning of transuranic (TRU) waste retrieval operations, including the Waste Receiving and Processing (WRAP) Facility, as VNC generated approximately 3.8% of the total volume of TRU waste currently stored at the Hanford Site.

1.2 BACKGROUND

Since 1944, the production of defense-related materials has resulted in radioactive wastes at the Hanford Site from onsite and offsite generators. The bulk of these wastes have been disposed of or stored in the 200 East and 200 West Area burial grounds and waste storage facilities.

In the period between 1944 and 1970, both TRU and low-level wastes (LLW) were disposed of in shallow land trenches with no attempt to segregate these materials by their chemical or radioactive natures. In 1970 the U.S. Atomic Energy Commission (AEC) (now the U.S. Department of Energy [DOE]) directed that AEC sites segregate "waste with known or detectable contamination of transuranium nuclides" from other waste types [*Immediate Action Directive (IAD) 0511-21* (Duncan, 1991)]. TRU radionuclides are those with an atomic number greater than 92. The AEC further directed that these wastes be packaged and stored as contamination-free packages for at least 20 years. The 20-year interim storage period was to allow time to study permanent disposal options for TRU-contaminated wastes.

The IAD did not provide a detailed definition of TRU waste in 1970. AEC contractors implemented the IAD to the best of their ability with the instrumentation then available. In 1973, the *Atomic Energy Commission Manual* (AEC 1973) further defined TRU waste as material contaminated with certain alpha-emitting radionuclides with half-lives greater than 20 years and activity greater than 10 nCi/g. The radionuclides included were ²³³U and its daughter products as well as plutonium and transplutonium nuclides with the exception of ²³⁹Pu and ²⁴¹Pu. In 1982, the TRU waste segregation limits were raised to 100 nCi/g by DOE Order 5820.1, *Management of Transuranic Material* (DOE 1982).

In addition to radioactive materials, a wide variety of chemicals can be found in the solid wastes that are stored or disposed of at the Hanford Site. Many of these chemicals are currently classified as dangerous or hazardous by the U.S. Environmental Protection

Agency (EPA) and the Washington State Department of Ecology (Ecology). When dangerous or hazardous wastes are found in radioactive wastes they are termed "mixed" wastes (MW).

When much of the MW now located at the Hanford Site was generated, there were no definitions or regulations governing the storage, disposal, or documentation of MW. In 1987, the DOE issued a mixed by-product ruling (10 CFR 962) stating that the hazardous components of MW are regulated by the *Resource Conservation and Recovery Act of 1976* (RCRA). In November 1987 the EPA authorized Ecology to regulate the hazardous constituents of MW at the Hanford Site (40 CFR 265).

During the next two decades the TRU waste now stored in the burial trenches and storage facilities is to be retrieved, processed at the WRAP Facility, and shipped to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico for final disposal. Approximately 3.8% of the total volume of TRU waste to be retrieved for shipment to WIPP was generated by the VNC and transported to the Hanford Site for interim storage.

1.3 SOURCES

Data for this study were compiled from a variety of sources. Each of the major sources is listed below with a few explanatory notes. Greater detail on each of the data sources can be found in the body of this document as the information from each is discussed.

Documents that describe pertinent VNC processes and experiments including the *Vallecitos Tour Guide* (Nixon and Crosby 1984), the *Final Report — Deactivation of the Plutonium Analytical Laboratory* (Sabol 1982), *General Electric Fuel Laboratory Decontamination and Decommissioning*, GEF-00616-1 (Thompson et al. 1982a), and *General Electric Fuels Laboratory Decontamination and Decommissioning Appendices*, GEF-00616-2, (Thompson et al. 1982b), were used to determine the solid wastes that were generated at VNC and sent for storage at the Hanford Site between 1974 and 1984.

Documents that describe VNC Waste Packaging and Handling Procedures including the *Hanford Site Radioactive Solid Waste Acceptance Criteria* (Willis and Triner 1991), were used to describe packaging and handling practices.

Interviews with GE personnel at the VNC were used to gather information regarding unusual waste contents and historical waste handling and packaging procedures.

Characterization data were primarily derived from the Solid Waste Information and Tracking System (SWITS) database. The SWITS database was created in 1991, primarily with the solid waste data from the Richland Solid Waste Information Management System (R-SWIMS). The SWITS database contains information about radioactive wastes, both TRU and LLW, buried or stored in the 200 Areas since 1970. Data in SWITS were originally taken from Solid Waste Burial Records (SWBRs) and their replacements, the Solid

Waste Storage and Disposal Records (SWSDRs). Both SWBRs and SWSDRs, which will be jointly referred to as "burial records" in this document, often contain supplementary forms such as shipment manifests, U.S. Nuclear Regulatory Commission (NRC) 741 Forms, etc.

Hazardous waste components were determined using information from the SWITS database, SWBRs, SWSDRs, and personnel interviews. Additional information was obtained from *Reactive and Unstable Chemicals in Transuranic Retrievable Waste at the Hanford Site*, WHC-EP-0603 (Reddinger 1992) and *Solid Waste Stream Hazardous and Dangerous Components* (Olson 1993).

1.4 SCOPE

The major sections of this document and the topics they cover are outlined briefly in the following paragraphs. Because of the number of tables and figures included in this report, they appear at the end of each section.

Section 2.0 provides a brief description of the VNC physical plant and the operations that occurred there. A short history of the significant VNC operations that generated the solid wastes that were transported to the Hanford Site for storage follows this description.

Section 3.0 identifies the solid waste streams that arose from pertinent VNC activities. The types of solid waste that may have been generated from each of the waste streams is discussed.

Section 4.0 discusses the waste handling and packaging procedures used for VNC wastes shipped to the Hanford Site. Historical changes in waste handling, packaging, and recordkeeping are also reviewed in this section.

Section 5.0 contains the results of a search for actual waste container data. The search includes database searches, literature reviews, and personnel interviews. This section describes what is known about the physical, radiological, and hazardous characteristics of the radioactive solid waste from VNC.

Section 6.0 lists the references used in the compilation of this report.

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2.0 DESCRIPTION OF THE VALLECITOS NUCLEAR CENTER

The VNC is owned and operated by GE. Initially known as the Vallecitos Atomic Laboratory, VNC was established in 1956 as a nuclear reactor research and development facility. In 1974 and 1980 the VNC was authorized by the AEC and the DOE, respectively, to send TRU waste to the Hanford Burial Grounds. The description that follows focuses on the specific areas of the VNC that produced the solid wastes shipped to the Hanford Site.

2.1 LOCATION

The VNC is situated on approximately $6.5 \times 10^6 \text{ m}^2$ (1,600 acres) of fenced land approximately 10 km (6 miles) south of Pleasanton, California. The site is about 56 km (35 miles) east of San Francisco and about 32 km (20 miles) north of San Jose. Figure 2-1 shows the geographical location of the VNC within California's Bay Area.

The reactors and support facilities are located in the southwest corner of the site on about $4.5 \times 10^5 \text{ m}^2$ (100-125 acres). The remainder of the site is hilly grassland, which is leased for grazing.

2.2 PHYSICAL PLANT

The VNC has four reactors on site:

- The General Electric Test Reactor (GETR)
- The Nuclear Test Reactor (NTR)
- The Vallecitos Boiling Water Reactor (VBWR)
- The Empire State Atomic Development Associates, Inc. (ESADA) Vallecitos Experimental Superheat Reactor (VESR).

The GETR (1959-77), VBWR (1957-63), and the VESR (1963-67) have been shut down. The small (100-kW) NTR, which started operating in 1957, continues to operate for neurographic applications.

Five main buildings support these reactors and other reactor programs:

- Building 102 — Materials Engineering Laboratories and Radioactive Products and Services Facilities (currently Radioactive Materials Laboratory and Administrative Offices)
- Building 103 — Metallurgy and Chemistry
- Building 104 — Maintenance Facilities

- Building 105 — Nuclear Test Reactor
- Building 106 — Engineering and Shop Operations (currently Shop Operations).

The VNC site plan is presented in Figure 2-2.

The waste sent to the Hanford Site was generated almost exclusively from Building 102 activities. Very minor amounts of waste in the form of metallurgical mounts and other sample preparation items were originated in Building 103, but were transferred to Building 102 for disposal.

2.2.1 Building 102 Description

Building 102 is a concrete building consisting of two floors: a ground floor and a basement. The two floors have a total of 3,275 m² (35,216 ft²) of floor space that is used for laboratory and office areas. A hot cell facility is located on the ground floor.

In 1962, a Plutonium Fuels Development Laboratory (PFDL) was established in the basement floor of Building 102. The PFDL was a licensed facility and was used in support of the AEC's (and the DOE's) fast reactor development program. The PFDL also was used for thermal reactor fuel experiments for the AEC and private customers. This facility was expanded in 1967 to increase fuel fabrication capacity, expanded in 1971 to include scrap recovery, and expanded again in 1974 to include plutonium nitrate to oxide conversion processing. In 1978, GE renamed the PFDL the Advanced Fuels Laboratory (AFL) because of the negative public connotation for plutonium at that time. During its existence, the PFDL/AFL was routinely referred to as simply the Fuels Laboratory (FL). Throughout the remainder of this document, we will use the acronym PFDL when referring to this laboratory. However, all three acronyms are used in the appendixes to this report.

The PFDL occupied approximately 405 m² (4,350 ft²) of basement floor space and consisted of four major processing systems:

- Nitrate to oxide conversion
- Scrap recovery and recycle
- Fuel and fuel pin fabrication
- Auxiliary supporting processes.

A layout of the PFDL is shown in Figure 2-3. In 1975, the PFDL became a DOE dedicated laboratory for fuel process development and fuel pin fabrication.

A Plutonium Analytical Laboratory (PAL) also was established in 1962 to provide chemical analysis services to the PFDL. The PAL was located on the ground floor of Building 102 where it occupied approximately 74 m² (800 ft²). The location of the PAL is shown in Figure 2-4.

2.3 PLUTONIUM FUELS DEVELOPMENT LABORATORY AND PLUTONIUM ANALYTICAL LABORATORY ACTIVITIES

The major activities of the PFDL/PAL were directed toward the development of chemical and mechanical processes for the fabrication of plutonium and mixed plutonium/uranium oxide fuel. The principal functions involved were the manufacture of test and demonstration fuel for six test reactors and four commercial reactors; development and demonstration of innovative processes for plutonium oxide and mixed oxide conversion; mixed oxide fuel fabrication; fuel rod and bundle fabrication; scrap recovery and recycle; and material property studies. The development objective was to recycle the plutonium that was recovered from chemical reprocessing of spent uranium fuel into a pellet shape and composition useful for service in light water reactor power plants. The PFDL was fitted with appropriate processing equipment for the conversion of plutonium and uranium feed stocks into blended, plutonium-uranium fuel pellets. The PAL provided chemical analyses for process control and to verify compliance with product specifications.

2.3.1 Mixed Oxide Process

The PFDL developed a process that involved the coprecipitation of a nitric acid solution of uranium and plutonium with ammonium hydroxide and subsequent calcination of the precipitate slurry to a mixed oxide powder. This process was given the acronym COPRECAL, which stood for coprecipitation and calcination. A diagram of the COPRECAL process is presented in Figure 2-5. The PFDL also was involved with the preparation of mixed oxide fuel for the Fast Flux Test Reactor (FFTR) program.

2.3.2 Mixed Oxide Composition

In general, the mixed oxide fuel prepared for the FFTR program had a nominal 1-to-4 ratio of plutonium to uranium. The ^{240}Pu content of the plutonium employed was ~ 10% and ~ 16.5%. The ^{235}U enrichment levels of the uranium employed were 0.7% (normal), 37.5%, 45.5%, 75%, 87.5%, and 93%.

2.4 FACILITY HISTORY

The PFDL/PAL operated from 1962 until 1978 under DOE sponsorship. These facilities participated in the Fast Ceramic Reactor (FCR) program and the FFTR program via the preparation of plutonium-uranium fuels. The deactivation of the fuel fabrication laboratory commenced in 1979. By agreement with the DOE, the waste generated by decontamination and decommissioning (D&D) activities was sent to the Hanford Site as retrievable TRU waste.

For over 20 years, the PFDL/PAL fabricated mixed oxide fuels (coprecipitated and physically blended), developed processes, process equipment, process control procedures, and studied fuel properties (including alkali metal compatibility with fuel and cladding materials). The PFDL manufactured some 171,000 pellets and over 1,100 fuel

pins for both fast and thermal reactors. In the manufacturing process the PFDL accommodated six cladding materials. The laboratory handled 60 kg of plutonium and 1.2 metric tons of mixed oxide fuel during its existence.

The routine operational radioactive wastes generated by AEC/DOE programs and light water programmatic activities were shipped to commercial radioactive storage sites located at Beatty, Nevada and the Hanford Site in Washington. These commercial storage sites were operated by Nuclear Engineering Company (currently U.S. Ecology). An exception to commercial burial was the disposal of irradiated fuel pins associated with the AEC FCR and FFTR programs. This irradiated waste was sent to the Hanford Site for disposal.

Figure 2-1. Geographic Location of the Vallecitos Nuclear Center.

BAY AREA MAP

Figure 2-2. Vallecitos Nuclear Center Site Plan.

Figure 2-3. Layout of Plutonium Fuels Development Laboratory.

Figure 2-4. Building 102, Ground Floor Layout.

Figure 2-5. The COPRECAL Process.

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3.0 SOLID WASTE GENERATION

The routine solid radioactive wastes generated by VNC operations were sorted, packaged, and transported from VNC under the auspices of the NRC. These operational wastes were sent to commercial burial sites at Beatty, Nevada and the Hanford Site, Washington, which were operated by the Nuclear Engineering Company. No routine operational radioactive wastes were sent to DOE's Hanford Site waste burial trenches.

The solid radioactive wastes authorized by AEC and DOE to be sent to the Hanford Site for disposal were associated with two AEC/DOE reactor programs: the FCR program, and the FFTR program. These programs involved the fabrication and testing of fuel assemblies that used plutonium in an oxide form. The development and testing of plutonium-bearing fuel assemblies by VNC was sponsored and funded by AEC and, later, DOE.

3.1 FAST CERAMIC REACTOR PROGRAM WASTES

The PFDL fabricated fuel pins for the FCR. These pins consisted of stainless steel tubes with an outer diameter of 0.64 cm and a length of 61-91 cm. Mixed oxide fuel was packed into the pins.

The fuel pins were used in irradiation tests conducted at the Experimental Breeder Reactor-2 (EBR-2) located at the Idaho National Engineering Laboratory. After irradiation, fuel pins were returned to VNC for diagnostic investigations and assessments. Consequently, unirradiated and irradiated solid wastes were generated. The unirradiated radioactive waste generated by the fabrication processes were sorted, packaged and shipped to the commercial radioactive storage site located at Beatty, Nevada. The irradiated wastes were sorted, packaged and sent to the Hanford Site burial grounds under AEC authorization. The shipment of the irradiated waste to the Hanford Site was carried out from February to June 1974. Failed fuel pins contaminated with trace amounts of NaK or sodium may exist, so precautions should be taken during waste retrieval and processing.

Minor quantities of diagnostic samples and sample mounts from the South Eastern Fast Oxide Reactor (SEFOR) program were commingled with the FCR wastes. The plutonium content of the mixed oxides for the SEFOR was 25% compared to the usual 20% for other programs.

3.2 PLUTONIUM FUEL PROGRAM DEACTIVATION WASTES

By a mutual contractual agreement between the DOE and VNC, the PFDL and the supporting PAL were deactivated in 1979. The equipment and supporting facilities were decontaminated and decommissioned, and the respective areas were restored to their original condition. The D&D activities were initiated in 1979 and completed in 1982. The

TRU waste generated by D&D was packaged and shipped to the Hanford Site. The waste shipments were received by Rockwell Hanford Operations (RHO) and were deposited in the 200 Area burial grounds located on the Hanford Site.

A final VNC report (Thompson et al. 1982a) and its Appendices (Thompson et al. 1982b) were prepared to document the relevant details of the entire PFDL D&D tasks. The Table of Contents and a List of Figures for this report are provided in Appendix A along with the Table of Contents for the Appendices. The types of waste generated by the D&D activities and summarized herein were obtained from these reports.

3.2.1 Fuel Fabrication Laboratory Waste

As addressed previously, the PFDL consisted of four unit processing systems:

- Nitrate-to-oxide conversion
- Scrap recovery and recycle
- Fuel and fuel pin fabrication
- Auxiliary supporting processes.

The gloveboxes involved with the four unit processing systems and their respective operational functions are presented in Table 3-1. Photographs of the cited glovebox line are shown in Appendix B.

The general types of solid waste generated by the D&D of the PFDL were process and fabrication equipment, gloveboxes, glovebox supporting apparatus, ventilation ducting, and other miscellaneous service items contaminated with plutonium. A partial list of discarded equipment items follows:

- Centerless grinding equipment
- Sintering furnace
- Gaging and inspection apparatus
- Glass tanks
- Gloveboxes
- Powder collector assembly
- Calciner assembly
- Feed nozzle assembly
- Scrubber assembly

- Precipitator assembly
- Reduction vessel assembly.

**Table 3-1. Operational Functions of Gloveboxes
for the Four Unit Processing Systems.**

Processing System	Glovebox Number	Operational Function
Nitrate-to-Oxide Unit Operation	51	Nitrate-to-oxide conversion
	51A	Nitrate conversion load-in scrubber
	51B	Nitrate conversion offgas
Scrap Recovery and Recycle Unit Operation	50	Dissolution ($\text{HF} + \text{HNO}_3$), ion exchange, concentration, and waste storage
	50A	Plutonium nitrate load-out and liquid waste solidification
	51B	Offgas scrubber and nitrate conversion
Fuel and Fuel Pin Fabrication Unit Operation	37	Oxide blending
	38	Slugging and granulation
	39	Pellet pressing
	40	Sintering
	41	Grinding
	42	Inspection
	43	Fuel pin loading
	24	Fuel pin welding
Auxiliary Supporting Processes	44	Fuel Pellet machining
	22	Fume hood
	27 & 35	General purpose
	29	Metallography/alpha autoradiography
	30	Micro oxygen-to-metal ratio
	31-32	Sodium-fuel-cladding compatibility

The decontamination and demolition of the processing lines and process equipment also generated small items such as fabrication tooling and gaging, inspection apparatus, valving, piping, tubing, flanges, wiring, and unistruts.

3.2.2 Plutonium Analytical Laboratory Waste

The decontamination and demolition of the PAL generated large, intermediate and small items similar to the items generated by the D&D of the PFDL. The largest items were the gloveboxes and glovebox support equipment. The intermediate size items were mainly analytical and sample preparation apparatus and segments of heating/ventilation/air conditioning (HVAC) duct work. The small items were broken glass, wiring, tubing, unistruts, shelving, etc.

3.3 TRANSURANIC WASTE ITEMS

Certain items and materials have been identified as TRU waste constituents. To provide a better understanding of the nature of these constituents, the tasks and activities that produced or generated these constituents have been identified. The list below matches the TRU waste constituents with the tasks and activities involved in their generation.

- Carborundum — Mixed-oxide pellet grinding
- Cement — Employed to solidify solutions and slurries
- Ceramics — Used as insulators
- Concrete — Generated by decontamination and demolition activities
- Cotton/Kotex¹ — Cleanup swabs and pads
- Glass — Spent equipment
- Marble — Laboratory bench tops
- Molybdenum — Used in high temperature sintering
- Oils — Spent vacuum pump oil
- Plastic/polyurethane — Cut-out bags and shipping container filler
- Paper/cardboard — Paperwork, labels, and cartons.

¹Kotex is a trademark of the Kotex Corporation.

4.0 SOLID WASTE HANDLING PRACTICES AND PROCEDURES

4.1 FAST CERAMIC HANDLING PRACTICES AND PROCEDURES

During the tenure of the FCR program, a variety of diagnostic tests and examinations of the irradiated FCR fuel pins were conducted. The bulk of the waste from the FCR program was comprised of these fuel pins. The cut ends of the fuel pins were sealed with an epoxy resin.

The waste shipped from VNC's FCR program to the Hanford Site also included other items such as metallographic mounts, diagnostic samples, sweepings, and housekeeping materials. These wastes were removed from the glovebox lines and hot cells via bag-out procedures. The cut-out plastic bags were triply heat sealed to ensure bag closure integrity. Several types of cans were used to accommodate the small items removed from glovebox lines and hot cells. Galvanized gallon (paint) cans with no knobs or balls were used in the hot cells to remove small items. The lid was sealed using small clamps and a rubber gasket sealing arrangement. The sealed gallon cans were removed from the hot cell and placed into specially designed GE liners. Wastes removed in sealed plastic bags were placed into aluminum fruit cans which were rolled sealed mechanically. The following sizes of fruit cans were available:

1. 30-cm (12-in.) height, 3.81-cm (1-1/2-in.) diameter, 0.16-cm (1/16-in.) wall thickness
2. 15-cm (6-in.) height, 8.89-cm (3 1/2-in.) diameter, 0.16-cm (1/16-in.) wall thickness.

Two sizes of cylindrical liners were fabricated to accommodate the irradiated FCR waste. Both liners were made of 6061-T6 Aluminum and have threaded brass caps sealed with o-rings. The bottom was fitted with a stationary 3.81-cm hexagonal nut to provide a mechanism to secure the liner during the lid tightening process. The bottom rim of the short liner had two 1.43-cm diameter holes 180° apart. An appropriate holding bar was inserted through the holes to provide a way to secure the liner during the lid tightening process.

The main dimensional differences between the two liners were the diameter and height. The approximate dimensional differences are compared below:

Designation	Outer Diameter	Wall Thickness	Height
Inner Storage Container	13 cm	1.087 cm	116.2 cm
Waste Liner	18 cm	0.635 cm	38 cm

Configuration overviews are provided in Figure 4-1 for the 13-cm (5-in.) waste liner and Figure 4-2 for the 18-cm (7-in.) waste liner. For discussion purposes both items are referred to as GE waste liners. The galvanized gallon containers were placed in the 18-cm (7-in.) GE waste liners, while the aluminum cans were placed in both the 18-cm (7-in.) and 13-cm (5-in.) GE waste liners.

The packed and sealed liners were placed into shipping casks for transport to the Hanford Site. Shipping records indicate that the usual loading arrangement was four to five liners per shipping cask. A summary of shipping and burial data is provided in Appendix C, along with the fabrication drawings for the 13-cm (5-in.) waste liner and the 18-cm (7-in.) waste liner.

4.2 FUEL FABRICATION LABORATORY WASTE PACKAGING

The DOE issued stringent packaging specifications and rigorous decontamination requirements for discarding plutonium contaminated equipment and gloveboxes. These specifications and requirements had to be satisfied before DOE would authorize shipment of radioactive wastes to the Hanford Site for burial as retrievable waste. These specifications and requirements are listed below:

- The primary decontamination limit used for gloveboxes was the solid LLW criterion of $\leq 2 \mu\text{Ci}/\text{cm}^2$.
- The NRC required the glovebox contaminant package to withstand a 1.2-m drop in the most vulnerable corner. Accordingly, a new, highly reinforced shipping package was successfully designed by GE personnel. It was applied also to the PAL need.
- The retrievable storage requirements included fiberglassing of outer surfaces and the ability of the packages to withstand burial at 5-m and loads imposed by packing the earth fill with a 24.5-metric ton bulldozer.
- The insertion of internal cribbing between the glovebox and the package was required, including wire cable fastening plus 10-cm x 10-cm vertical bracing.
- For some of the shipments, a rigid polyurethane foam was necessary to fill interior voids.
- A quality assurance system and complete records were to be prepared, appropriately approved, and archived for retrieval for subsequent inspection.

Two primary shipping packages were employed to accommodate the plutonium-contaminated solid waste:

1. A GE-designed large wooden box designated GE Model No. 71-9136 7A shipping package, and
2. U.S. Department of Transportation (DOT) 17C or 17H 55-gal drums.

The GE Model 71-9136-7A shipping package was designed and constructed in accordance with criteria for compliance with 49 CFR, Paragraph 178-350 and 10 CFR 71, Paragraphs 71.31, 71.32, and 71.35 and Appendix A - Normal Conditions of Transport. The design, construction, and testing of the GE Model No. 71-9136 container (box) is provided in a GE Report *General Electric Fuels Laboratory Decontamination and Decommissioning* (Thompson et al. 1982a). A coating of fiberglass reinforced polyester (FRP) was applied to the wood and plywood GE-9136 waste containers. A comprehensive Quality Assurance (QA) and Quality Control (QC) program was used to ensure high quality construction, loading, labeling, and sealing. The QA and QC programs are also presented in the GEF-00616-2 report (Thompson et al. 1982a). The DOT 17C/17H drums were overpacked using a N-55 shipping package. A N-55 shipping package loading diagram is shown in Figure 4-3. The N-55 overpack drums were provided to VNC by RHO, which operated the Hanford Site burial trenches at that time. The DOT 17C galvanized 55-gal drums were procured to RHO Specification No. HWS10242. The drums were inspected when received according to a QA plan, and nonconformances were documented accordingly.

Photographs of 17C drum loading, a sealed 17C drum, glass tank loading into a GE 9136 waste container, foam application to loaded equipment, a foamed shipping package, an N-55 drum overpack and a partially loaded Model 9136 shipping package are shown in Appendix D. A waste packaging summary for the PFDL is presented in Table 4-1.

The quantities and distribution of plutonium and uranium shipped to the Hanford Site from the PFDL D&D are provided in Table 4-2. As indicated in Table 4-2, the total quantity of plutonium shipped was 395.40 g, and the total quantity of uranium (natural and depleted) shipped was 94,148.16 g. The major portion (~ 392 g) of the plutonium and uranium (~ 94,134 g) was contained in the drum shipments. A more detailed breakdown of the shipping data presented in Table 4-2 is provided in Appendix E.

4.3 PLUTONIUM ANALYTICAL LABORATORY WASTE SHIPPING PACKAGING

The PAL used essentially the same packaging techniques, packaging configuration, and types of shipping containers as the PFDL. The large items (gloveboxes) were decontaminated to levels below the TRU definition (< 100 nCi/g of matrix) and packaged in GE 9136 FRP-coated boxes. The smaller items were packaged into DOT 17C/17H 55-gal drums. A waste packaging summary for the PAL is presented in Table 4-3. A breakdown of the plutonium and uranium quantities for each drum of PAL TRU waste is provided in Table 4-4. As indicated in Table 4-4, the total amounts of plutonium and uranium shipped were 11.60 and 6.35 g, respectively.

The gloveboxes were prepared for D&D by first removing all of the special nuclear materials (SNM) followed by bagging out all the miscellaneous portable items and placing them in steel drums. The glovebox interior surfaces were subjected to wiping, scrubbing, brushing, vacuuming, etc. in preparation for a radiation survey. The results of the final radiation survey are presented in Table 4-5.

The exterior of the gloveboxes were treated as follows:

- External fluorescent lighting fixtures were removed.
- The magnihelix gauges and inlet air filters as well as their respective housings were removed.
- The glovebox gloves were removed from the gloveports.
- Plywood protective corners were placed over the following glovebox openings and secured in place with plastic tape:
 - gloveports
 - inlet air filter housings
 - bag-out ports
 - sphincter ports
 - other miscellaneous glovebox penetrations.

Plywood then was placed to cover the entire plexiglass window area and was sealed in place with tape and room temperature-vulcanizing (RTV) mastic¹. Photographs of the general glovebox configurations and ancillary ventilation items are provided in Appendix F.

It was necessary to insert cribbing, wire cabling, and vertical bracing between the glovebox and the packaging container to ensure shipping container integrity during transport to the Hanford Site and subsequent burial confinement. For some shipments, a rigid polyurethane foam was employed to fill interior voids. The polyurethane foam and other similar rigid foams employed in the packaging scheme were commercial products [marketed under the INSTAPAK² registered trade name]. Technical data sheets, Material Safety Data Sheets (MSDS) and fire testing data for INSTAPAK foam are provided in Appendix G for informational purposes.

A Work Guide (provided in Appendix H) was prepared by GE to address the loading of the shipping packages. The purpose of the Work Guide was to:

- Provide for proper loading
- Provide for quality and compliance inspections
- Provide for proper labeling
- Provide for release approval for shipment.

¹RTV is a trademark of the General Electric Company, Polymer Products Dept.

²INSTAPAK is a trademark of Sealed Air Corporation.

4.4 WASTE SHIPPING

Four types of shipping containers were employed for the transport of the waste to the Hanford Site:

- The GE-designed and certified wooden package (9136 boxes) for the gloveboxes
- N-55 overpacks for shipment of metal waste drums, one for each drum
- Super Tiger containment for packages too large for drums
- Standard type 7A containers for low specific activity-type waste.

The above shipping containers and contents were accepted by DOE as government property via a DOE Acceptance Form for Waste Generated at GE-FL. This form is presented in Appendix I.

The PAL D&D activities generated a total of 104 m³ (3,718 ft³) of waste consisting of equipment and miscellaneous items. Further discussion of the character of these wastes can be found in Section 5.0.

Figure 4-1. 13-cm (5-in.) Waste Liner.

Figure 4-2. 18-cm (7-in.) Waste Liner.

Figure 4-3. N-55 Shipping Package -- Loading Diagram.

Table 4-1. Summary of Waste from the Plutonium Fuels Development Laboratory. (4 sheets)

Item Number	Equipment Number/ Identification	Serial Number	Equipment Outer Dimensions			Container Outer Dimensions			Total Volume (ft³)			Reassigned Surface Area m² (ft²)	Serial Number Equipment Priority	Assigned Weight kg (lb)
			Depth cm	Height cm	Length cm	Depth cm	Height cm	Length cm	Equipment m³	Container m³				
GE 9136 Container Package Summary														
1	7	384	117 (46)	117 (46)	155 (61)	188 (74)	188 (74)	190 (75)	2.1 (75)	6.7 (238)	21.4 (230)	29	1903 (4196)	
2	22H	385	86 (34)	130 (51)	122 (48)	188 (74)	188 (74)	244 (96)	1.4 (49)	8.6 (304)	2.2 (24)	30	1633 (3600)	
3	27	358	89 (35)	97 (38)	15 (6)	170 (67)	224 (88)	307 (121)	1.9 (67)	11.7 (413)	31.9 (343)	4	1735 (3826)	
4	29	362	112 (44)	145 (57)	218 (86)	170 (67)	224 (88)	307 (121)	3.5 (125)	11.7 (413)	31.9 (343)	3	1781 (3926)	
5	30	379(c)	84 (33)	107 (42)	155 (61)	170 (67)	224 (88)	307 (121)	1.4 (49)	11.7 (413)	31.9 (343)	13	1903 (4195)	
6	31	371*	112 (44)	117 (46)	180 (71)	142 (56)	236 (93)	335 (132)	2.4 (84)	11.3 (398)	32.1 (346)	14	1964 (4330)	
7	31DT	386(a)	66 (26)	91 (36)	122 (48)	188 (74)	94 (37)	190 (75)	7 (26)	3.4 (119.5)	10.7 (115)	27	894 (1970)	
8	32	379(c)	112 (44)	157 (62)	145 (57)				2.5 (90)			13		
9	35	359	104 (41)	170 (67)	206 (81)	170 (67)	224 (88)	307 (121)	3.7 (129)	11.7 (413)	31.9 (343)	10	1911 (4212)	
10	37	378	104 (41)	188 (74)	284 (112)	170 (67)	224 (88)	307 (121)	5 (17)	11.7 (413)	31.9 (343)	6	1821 (4014)	
11	38	360	104 (41)	188 (74)	290 (114)	170 (67)	224 (88)	307 (121)	5.7 (200)	11.7 (413)	31.9 (343)	8	1850 (4078)	
12	42	361	117 (46)	188 (74)	284 (112)	170 (67)	224 (88)	307 (121)	6.3 (221)	11.7 (413)	31.9 (343)	1	1818 (4008)	
13	43	377	107 (42)	188 (74)	272 (107)	170 (67)	224 (88)	307 (121)	5.5 (193)	11.7 (413)	31.9 (343)	2	1808 (3987)	
14	44	364	104 (41)	188 (74)	269 (106)	170 (67)	224 (88)	307 (121)	5.3 (186)	11.7 (413)	31.9 (343)	9	1823 (4020)	
15	50-IE	368	99 (39)	297 (117)	203 (80)	142 (56)	236 (93)	335 (132)	6.0 (211)	11.3 (398)	32.1 (346)	15	1864 (4110)	
16	50-2M	373*	91 (36)	297 (117)	185 (73)	142 (56)	236 (93)	335 (132)	5.0 (178)	1.1 (38)	32.1 (346)	16	1774 (3910)	
17	50-3M	366*	91 (36)	297 (117)	185 (73)	142 (56)	236 (93)	335 (132)	5.0 (178)	1.1 (38)	32.1 (346)	17	1760 (3857)	
18	50-4W	374	99 (39)	297 (117)	203 (80)	142 (56)	236 (93)	335 (132)	6.0 (211)	1.1 (38)	32.1 (346)	23	1856 (4090)	
19	50A	375	99 (39)	244 (96)	190 (75)	170 (67)	226 (89)	343 (135)	4.6 (163)	13.2 (466)	34.9 (376)	24	1928 (4250)	
20	Tun/Fit	387	152 (60)	112 (44)	168 (66)	188 (74)	188 (74)	190 (75)	2.9 (101)	6.7 (238)	21.4 (230)	31	1324 (2920)	
21	SR Glass	388(b)	157 (62)	30 (12)	213 (84)	188 (74)	94 (37)	244 (96)	1.0 (36)	2.2 (76.25)	6.4 (69)	28	542 (1194)	

Table 4-1. Summary of Waste from the Plutonium Fuels Development Laboratory. (4 sheets)

Item Number	Equipment Number/ Identification	Serial Number	Equipment Outer Dimensions			Container Outer Dimensions			Total Volume (ft ³)		Reassigned Surface Area (ft ²)	Serial Number Equipment Priority	Assigned Weight (kg)
			Depth (in)	Height (in)	Length (in)	Depth (in)	Height (in)	Length (in)	Equipment (ft ³)	Container (ft ³)			
22	Duct(RND)	388(b)	155 (61)	81 (32)	213 (84)	188 (74)	188 (74)	244 (96)	2.7 (95)	4.3 (152.5)	12.7 (137)	28	1082 (2386)
23	SDuct(RCT)	389	173 (68)	99 (39)	173 (68)	188 (74)	188 (74)	244 (96)	3.0 (105)	8.6 (304)	25.5 (274)	34	1895 (3738)
24	CDuct(RCT)	393	74 (29)	33 (13)	396 (156)	188 (74)	188 (74)	244 (96)	1.0 (34)	8.6 (304)	25.5 (274)	35	1983 (4372)
25	FI Filtr	390	142 (56)	84 (33)	157 (62)	188 (74)	188 (74)	190 (75)	1.9 (66)	6.7 (238)	21.4 (230)	32	1470 (3240)
26	BL Filtr	391	152 (60)	71 (28)	188 (74)	188 (74)	188 (74)	244 (96)	2.0 (72)	8.6 (304)	25.5 (274)	33	1639 (3612)
27	HX	386(a)	53 (21)	76 (30)	91 (36)	188 (74)	48 (19)	190 (75)	.4 (13)	1.7 (60.25)	5.4 (58)	27	447 (985)
28	Filtr/Misc	395	152 (60)	112 (44)	168 (66)	188 (74)	188 (74)	190 (75)	2.9 (101)	6.7 (238)	21.4 (230)	36	1451 (3200)
29	39	381	142 (56)	185 (73)	272 (107)	170 (67)	224 (88)	307 (121)	7.2 (253)	11.7 (413)	31.9 (343)	11	1960 (4320)
30	40	382	155 (61)	112 (44)	335 (132)	130 (51)	117 (46)	381 (150)	2.9 (104)	5.8 (204)	21.8 (235)	12	2250 (4960)
31	41	376	119 (47)	185 (73)	310 (122)	170 (67)	226 (89)	343 (135)	6.9 (242)	13.2 (466)	34.9 (376)	7	1973 (4350)
32	51-1E	365	99 (39)	297 (117)	203 (80)	142 (56)	236 (93)	335 (132)	6.0 (211)	11.3 (398)	32.1 (346)	18	1833 (4040)
33	51-2M	380*	91 (36)	297 (117)	94 (37)	142 (56)	236 (93)	335 (132)	2.5 (90)	11.3 (398)	32.1 (346)	19	1619 (3570)
34	51-3M	367	91 (36)	297 (117)	185 (73)	142 (56)	236 (93)	335 (132)	5.0 (178)	11.3 (398)	32.1 (346)	2	1780 (3925)
35	51-4M	372	91 (36)	297 (117)	185 (73)	142 (56)	236 (93)	335 (132)	5.0 (178)	11.3 (398)	32.1 (346)	21	1823 (4020)
36	51-5W	369*	91 (36)	297 (117)	203 (80)	142 (56)	236 (93)	335 (132)	5.5 (195)	11.3 (398)	32.1 (346)	22	1774 (3910)
37	51B	370*	94 (37)	305 (120)	218 (86)	142 (56)	236 (93)	335 (132)	6.3 (221)	11.3 (398)	32.1 (346)	5	1897 (4182)
38	51C	383	150 (59)	252 (103)	135 (53)	170 (67)	226 (89)	343 (135)	5.3 (187)	13.2 (466)	34.9 (376)	25	1941 (4280)
39	Hyd. Res-2	392	152 (60)	112 (44)	168 (66)	188 (74)	188 (74)	190 (75)	2.9 (101)	2.2 (238)	21.4 (230)	26	1919 (4230)
40	NC Glass	388(b)	157 (62)	30 (12)	213 (84)	188 (74)	94 (37)	244 (96)	1.0 (36)	1.7 (60.25)	6.4 (69)	28	542 (1194)
41	HX	386(a)	53 (21)	76 (30)	91 (36)	188 (74)	48 (19)	190 (75)	0.4 (13)	1.7 (60.25)	5.4 (58)	27	447 (985)
Totals									149.1 (5264)	369.8 (13059)	1054.5 (11351)		65403 (144189)

Table 4-1. Summary of Waste from the Plutonium Fuels Development Laboratory. (4 sheets)

Item Number	Equipment Item	Drum Number	Equipment Outer Dimension			Container Outer Dimension			Total Volume m³ (ft³)			Weight kg (lb)	Date Shipped
			Depth cm (in)	Height cm (in)	Length cm (in)	Depth cm (in)	Height cm (in)	Length cm (in)	Equipment	Container cm (in)			
LSA Package Summary													
1D	•	LSAD1	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	138 (304)	5/19/81	
2D	•	LSAD2	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	190 (419)	5/19/81	
3D	•	LSAD3	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	91 (201)	5/19/81	
4D	•	LSAD4	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	70 (154)	5/19/81	
5D	•	LSAD5	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	65 (143)	5/19/81	
6D	•	LSAD6	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	116 (256)	5/19/81	
7D	•	LSAD7	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	118 (260)	5/19/81	
8D	•	LSAD8	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	96 (212)	5/19/81	
9D	•	LSAD9	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	76 (168)	3/8/82	
10D	•	LSAD10	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	127 (280)	3/8/82	
11D	•	LSAD11	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	107 (236)	3/8/82	
12D	•	LSAD12	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	104 (229)	3/8/82	
13D	•	LSAD13	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	140 (306)	3/8/82	
14D	•	LSAD14	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	169 (372)	3/8/82	
15D	•	LSAD15	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	190 (418)	3/8/82	
Drum Totals										0.19 (112.5)	1796 (3960)		
1B	••	LSAB1	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	964 (2125)	10/14/81	
2B	••	LSAB2	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	744 (1640)	10/14/81	
3B	••	LSAB3	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	953 (2100)	10/14/81	
4B	••	LSAB4	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	676 (1490)	10/14/81	
5B	••	LSAB5	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	676 (1490)	10/14/81	

Table 4-1. Summary of Waste from the Plutonium Fuels Development Laboratory. (4 sheets)

Item Number	Equipment Item	Drum Number	Equipment Outer Dimension			Container Outer Dimension			Total Volume m ³ (ft ³)			Weight kg (lb)	Date Shipped	
			Depth cm (in)	Height cm (in)	Length cm (in)	Depth cm (in)	Height cm (in)	Length cm (in)	Equipment	Container cm (in)	Container cm (in)			
6B	**	LSAB6	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	3.2 (112.0)	1002 (2210)	4/21/82	
7B	**	LSAB7	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	3.2 (112.0)	862 (1900)	4/21/82	
8B	**	LSAB8	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	3.2 (112.0)	998 (2200)	4/21/82	
9B	UO ₂	LSAB9	122 (48)	183 (72)	274 (108)	170 (67)	224 (88)	307 (121)	216	11.7 (413.0)	11.7 (413.0)	1688 (3722)	10/14/81	
10B	51A	LSAB10	99 (39)	244 (96)	224 (88)	170 (67)	224 (88)	307 (121)	191	11.7 (413.0)	11.7 (413.0)	1178 (2600)	10/14/81	
11B	**	LSAB11	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	1.8 (65.0)	1.8 (65.0)	1211 (2670)	5/18/82	
12B	**	LSAB12	74 (29)	89 (35)	91 (36)	107 (42)	152 (60)	147 (58)	21	2.4 (85.0)	2.4 (85.0)	504 (1112)	4/21/81	
13B	**	LSAB13	-	N/A	-	173 (68)	99 (39)	173 (68)	N/A	2.9 (104.0)	2.9 (104.0)	1176 (2590)	5/18/82	
14B	**	LSAB14	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	3.2 (112.0)	901 (1988)	4/21/82	
15B	**	LSAB15	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	3.2 (112.0)	900 (1965)	4/21/82	
16B	**	LSAB16	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	3.2 (112.0)	754 (1662)	4/21/82	
17B	**	LSAB17	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	3.2 (112.0)	814 (1794)	4/21/82	
18B	**	LSAB18	-	N/A	-	188 (74)	117 (46)	246 (97)	N/A	5.4 (191.0)	5.4 (191.0)	2132 (4700)	5/18/82	
19B	**	LSAB19	-	N/A	-	185 (73)	185 (73)	302 (119)	N/A	10.4 (367.0)	10.4 (367.0)	1833 (4040)	7/27/82	
20B	**	LSAB20	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	3.2 (112.0)	621 (1370)	7/27/82	
			Box Totals									87.6 (3094.0)		21000 (46258)
			Grand Totals									90.8 (3206.5)		22796 (50254)

Table 4-2. Plutonium and Uranium Shipped in Wastes from the Plutonium Fuels Development Laboratory.

Shipment I. D.	Ci	Plutonium (g)		Uranium (g)
		Element	Fissile	
Drum Shipment 1	144.45	91.73	80.85	199.53 Natural
Drum Shipment 2	175.20	175.20	95.80	18,319.99 Natural/Depleted
Drum Shipment 3	210.94	134.28	118.84	73,834.99 Natural
Drum Shipment 4	92.00	52.72	47.59	1,779.79 Natural
LSA and 9136	5.88	3.41	Not Available	13.86 Not Available
Container Shipment Total	628.17	395.40	343.08	

LSA = low specific activity

Table 4-3. Summary of Waste from the Plutonium Analytical Laboratory.

Item Number	Equipment Identification Numbers	Serial Number	Equipment Outer Dimensions			Container Outer Dimensions			Total Volume m³ (ft³)		Surface Area m² (ft²)	Weight kg (lbs)	Date Shipped
			Depth cm (in)	Height cm (in)	Length cm (in)	Depth cm (in)	Height cm (in)	Length cm (in)	Equipment	Container			
GE 9136 Container Package Status													
P1	101	400	104 (41)	188 (74)	282 (111)	170 (67)	224 (88)	307 (121)	5.5 (195)	11.7 (413)	31.9 (343)	1810 (3990)	6/23/82
P2	102	401	104 (41)	188 (74)	526 (207)	170 (67)	224 (88)	307 (121)	10.3 (363)	11.7 (413)	31.9 (343)	1808 (3986)	6/23/82
P3	103	402	89 (35)	142 (56)	216 (85)	170 (67)	224 (88)	307 (121)	2.7 (96)	11.7 (413)	31.9 (343)	1600 (3528)	6/15/82
P4	106	403	119 (47)	157 (62)	279 (110)	170 (67)	224 (88)	307 (121)	5.3 (185)	11.7 (413)	31.9 (343)	1800 (4190)	6/15/82
P5	107	404	107 (42)	188 (74)	282 (111)	170 (67)	224 (88)	307 (121)	5.7 (200)	11.7 (413)	31.9 (343)	1861 (4102)	6/15/82
P6	10	405	84 (33)	119 (47)	122 (48)	170 (67)	224 (88)	307 (121)	1.2 (43)	11.7 (413)	31.9 (343)	1515 (3341)	6/15/82
P7	Vert	406	152 (60)	112 (44)	117 (46)	163 (64)	188 (74)	190 (75)	2.0 (70)	6.7 (238)	21.4 (230)	1458 (3215)	5/18/82
Totals									32.6 (1152)	76.9 (2716)	212.6 (2286)	11963 (26351)	
LSA Package Summary													
160	*	LSAD16	-	N/A	-	-	N/A	-	N/A	0.21 (7.5)	N/A	120 (265)	3/22/82
168	**	LSAB16	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	N/A	894 (1930)	4/21/82
208	**	LSAB20	-	N/A	-	137 (54)	185 (73)	333 (131)	N/A	8.5 (299.0)	N/A	2835 (6250)	6/23/82
218	**	LSAB21	-	N/A	-	225 (93)	117 (46)	315 (124)	N/A	8.7 (307.0)	N/A	2016 (4446)	6/23/82
248	**	LSAB24	-	N/A	-	107 (42)	122 (48)	244 (96)	N/A	3.2 (112.0)	N/A	585 (1290)	7/24/82
258	**	LSAB25	-	N/A	-	76 (30)	102 (40)	135 (53)	N/A	1.0 (37.0)	N/A	222 (490)	7/24/82
Totals										24.8 (874.5)		6472 (14270)	

*Drums contain small pieces of broken glass, wire, tubing, unstruts, and other small non-contaminated items.

**Boxes contain large pieces of piping, conduit, hardware electrical panels, compacted soft waste, and other assorted large non-contaminated items.

Table 4-4. Summary of Waste from the Plutonium Analytical Laboratory.

TRU Waste Drum Status											
Item Number	Drum Number/ Identification	Ci	Pu (g)	U (g)	Pu Fissile (g)	U Fissile (g)	Shipment Number	Total Volume m ³ (ft ³) Equipment Cont.	Surface Area m ² (ft ²)	Weight kg (lbs)	Date Shipped
1	1090	4.89	3.12	6.35	2.90	0.03	N55 #4	0.21 (7.5)	N/A	216 (478)	3/22/82
2	1093	0.05	0.03	0.0	0.03	0.00	N55 #4	0.21 (7.5)	N/A	82 (180)	3/22/82
3	1094	0.02	0.01	0.0	0.01	0.00	N55 #4	0.21 (7.5)	N/A	102 (224)	3/22/82
4	1101	1.16	0.68	0.0	0.60	0.00	N55 #4	0.21 (7.5)	N/A	80 (132)	3/22/82
5	1107	0.80	0.32	0.0	0.26	0.00	N55 #4	0.21 (7.5)	N/A	95 (210)	3/22/82
6	1108	0.60	0.35	0.0	0.31	0.00	N55 #4	0.21 (7.5)	N/A	127 (280)	3/22/82
7	1109	0.95	0.55	0.0	0.49	0.00	N55 #4	0.21 (7.5)	N/A	145 (320)	3/22/82
8	1110	0.55	0.32	0.0	0.28	0.00	N55 #4	0.21 (7.5)	N/A	101 (222)	3/22/82
9	1112	4.08	2.40	0.0	2.11	0.00	N55 #4	0.21 (7.5)	N/A	91 (200)	3/22/82
10	1113	0.49	0.29	0.0	0.24	0.00	N55 #4	0.21 (7.5)	N/A	79 (176)	3/22/82
11	1114	0.08	0.05	0.0	0.04	0.00	N55 #4	0.21 (7.5)	N/A	136 (300)	3/22/82
12	1115	0.23	0.13	0.0	0.12	0.00	N55 #4	0.21 (7.5)	N/A	120 (266)	3/22/82
13	1124	0.05	0.03	0.0	0.03	0.00	N55 #4	0.21 (7.5)	N/A	80 (178)	3/22/82
14	1126	0.11	0.07	0.0	0.07	0.00	N55 #4	0.21 (7.5)	N/A	75 (166)	3/22/82
15	1218	0.45	3.25	0.0	3.17	0.00	N55 #4	0.21 (7.5)	N/A	75 (166)	3/22/82
16	1236	<0.01	<0.01	<0.01	<0.01	<0.01	N55 #4	0.21 (7.5)	N/A	69 (152)	3/22/82
17	1238	<0.01	<0.01	<0.01	<0.01	<0.01	N55 #4	0.21 (7.5)	N/A	75 (166)	3/22/82
Totals		14.31	11.60	6.35	10.66	0.03		3.61 (127.5)		1727 (3807)	
Grand Totals								105.3 (3718.0)		20152 (44428)	

Table 4-5. Glovebox Radiation Survey Results.

Shipping Package Serial Number	Glovebox Identification	Total α Activity, nCi	Specific Surface α Activity $\mu\text{Ci}/\text{cm}^2$ (4)	Box Duty
400	101	7.95	0.048	Wet Analysis
401	102	5.45	0.033	Impurity Analysis
402	103	5.30	0.058	Dissolve Analysis
403	106	28.8	0.146	Gas Analysis
404	107	3.85	0.023	Development
405	10	13.2	0.368	Waste Handling

5.0 CHARACTERIZATION OF RETRIEVABLE STORED SOLID WASTE GENERATED BY GENERAL ELECTRIC VALLECITOS NUCLEAR CENTER

The information found in this section is based primarily on data from the SWITS database. This database, which incorporated the older R-SWIMS database, is used to track information on radioactive and other waste stored or disposed at the Hanford Site. Radioactive solid waste packages have been tracked since 1970. In the intervening years, changes in the requirements and regulations governing radioactive wastes have left their mark in the quantity and quality of the data tracked in this database. Caveats are included in the text to alert the reader to changes that may affect the interpretation of the data provided.

The bulk of the data provided is limited to information about the TRU waste that was generated at VNC; however, some general information on the non-TRU waste is included for completeness. Tables 5-1 and 5-2 present TRU and non-TRU waste generation summaries sorted by container type and year. Since the initial retrieval efforts and WRAP 1 will focus on 55-gal drums, these containers are considered separately from all other container types. Therefore, the term "other containers" in this report will refer to all container types except 55-gal drums. The term "drum" refers to 55-gal drums only.

The original SWITS data that form the basis for most of the tables and figures in this section can be found in Appendix J. Each computer run is preceded by the query used to generate the data.

5.1 SUMMARY OF GE VALLECITOS WASTE GENERATION

5.1.1 Waste Stored in 55-Gallon Steel Drums

The most common waste container for TRU waste stored at the Hanford Site is the 55-gal steel drum. The drums used are either DOT 17C or 17H produced from sheet with minimum thicknesses of 1.35 mm and 1.1 mm, respectively. Before 1982, most of the drums were painted, so these drums have approximately 0.13 mm of paint on both the exterior and interior. In 1982, galvanized drums replaced painted drums.

The 1970 *Immediate Action Directive* (Duncan 1991) stipulated that TRU wastes be packaged and stored as contamination-free packages for at least 20 years. The 20-year interim period was to allow time to study permanent disposal options for TRU-contaminated wastes. As more of the 55-gal drums reach and exceed the 20-year storage mark, more attention has been given to ascertaining the condition of these drums. A discussion of the previous studies of steel drum corrosion and degradation can be found in WHC-EP-0225, Rev. 1 (Anderson et al. 1991) and WHC-SA-1450-FP, Rev. 1 (Duncan et al. 1993).

Table 5-3 contains waste summary data for 55-gal drums of radioactive waste generated at VNC for storage at the Hanford Site between 1974 and 1983. The upper portion of this table indicates the number, total weight, and total volume of TRU and

non-TRU waste drums. MW drums are also indicated. The relative percentages of TRU and non-TRU wastes by container number, weight, and volume are listed at the bottom of the table. Figure 5-1 through 5-6 present this information graphically.

5.1.1.1 Number of Drums. Between 1974 and 1983, one hundred sixty-six 55-gal drums of radioactive waste were generated at VNC for storage at the Hanford Site. This total included 16 drums of non-TRU waste and 150 drums of TRU waste. The number of radioactive of MW drums is 94, which includes 8 non-TRU MW drums and 86 TRU MW drums. Figure 5-1 provides a graph of the number of 55-gal drums of TRU and LLW generated at VNC by year. Figure 5-2 shows the relative percentages of TRU and non-TRU waste drums by year.

The drums shown in these graphs for 1981 and 1982 contain waste from the D&D of the equipment and supporting facilities for the PFDL and the PAL which took place between 1979 and 1982. The definitions of TRU waste that applied at that time to the waste received from VNC are provided below:

- From 1974 to 1982, TRU waste was defined as waste with a concentration of > 10 nCi/g.
- In 1982, the current definition of > 100 nCi/g was implemented by the DOE.

5.1.1.2 Weight. Between 1974 and 1983, approximately 19,576 kg of TRU waste and 1,916 kg of non-TRU waste were generated at VNC and stored in 55-gal drums. These numbers may be estimates because it was not required to record individual container weights before 1977. During the R-SWIMS data re-entry program in the mid-1980's, all pre-1977 containers were assigned standard weights. All 55-gal drums, for instance, were assigned a value of 68 kg. The mean weight for VNC 55-gal drums since 1978 is 64 kg.

Figure 5-3 presents the total weight of both TRU and non-TRU radioactive wastes stored annually in 55-gal drums. The relative weight percentages for TRU and non-TRU drums generated annually at VNC are shown in Figure 5-4. Again, the drums in these graphs resulted from the D&D of the PFDL and PAL equipment and supporting facilities.

5.1.1.3 Volume. The total volume of TRU waste generated at VNC and stored in 55-gal drums is 31.8 m^3 and the total volume of non-TRU waste generated at VNC and stored in 55-gal drums is 3.4 m^3 . The volume of TRU and non-TRU waste generated between 1974 and 1983 and stored in 55-gal drums is shown in Figure 5-5. The relative percentages of TRU and non-TRU waste stored in 55-gal drums is provided in Figure 5-6. Since all 55-gal drums have a volume of 0.21 m^3 , the patterns shown in Figure 5-5 and 5-6 are the same as those described for Figures 5-1 and 5-2 (drum number), respectively. (They are included here for comparison with Figures 5-11 and 5-12.

5.1.2 Waste Stored in Containers Other Than 55-Gallon Steel Drums

Radioactive solid wastes have been stored or disposed of in a wide variety of containers other than 55-gal steel drums. In this discussion these containers will be referred to as "other containers." Container types used for the solid waste generated at VNC and stored at the Hanford Site include the following:

- Specially designed GE liners
- Concrete boxes
- Metal cans, drums, barrels, and kegs (other than 55-gal drums)
- FRP boxes
- Wooden boxes, cartons, or cases.

Table 5-4 summarizes the data for containers of radioactive waste other than 55-gal drums that were generated at VNC and sent to retrievable storage at the Hanford Site between 1974 and 1983. The upper portion of this table indicates the number, total weight, and total volume of TRU waste stored in other containers. The number of other containers of TRU MW is also provided. The same information for non-TRU waste follows. At the bottom of this table are the relative percentages of TRU and non-TRU wastes by container number, weight, and volume. Figures 5-7 through 5-12 present these data graphically.

The 22 concrete boxes from 1974 contain both high-level waste (HLW) fuel pins and TRU waste. Therefore, these containers are grouped with TRU waste in the SWITS runs and the tables generated from these runs. However, for ease in identifying these HLW containers, they have been separated from the TRU waste in all the figures in this report.

5.1.2.1 Number of Other Containers. Between 1974 and 1983, 90 other containers of radioactive waste were generated at VNC and stored at the Hanford Site. Of these containers, 65 hold TRU waste, while 25 contain fuel pins that are HLW. (During the same period of time, a total of one hundred sixty-six 55-gal drums of radioactive solid waste were generated at VNC.) Figure 5-7 is a graph of the number of other containers of TRU, HLW, and non-TRU generated at VNC and sent to retrievable storage at the Hanford Site by year.

The largest number of other containers containing TRU waste was generated in 1982 with 31 containers. These containers are the result of the PFDL and PAL D&D activities. Figure 5-8 presents the relative percentages of TRU, HLW, and non-TRU containers other than 55-gal drums.

5.1.2.2 Weight. In the period between 1974 and 1983, approximately 357,8834 kg of radioactive solid waste was generated at VNC and placed in containers other than 55-gal drums for storage at the Hanford Site. This total weight includes approximately

330,531 kg of TRU and 27,353 kg of non-TRU contaminated material. These weights are approximations because individual container weights were not required to be recorded before 1977. During an update of the R-SWIMS database in the mid-1980's, all waste containers without recorded weights were assigned standard values. For example, all 0.057-m³ boxes were given a standard weight of 5.5 kg, and 9-L lard cans were assigned a standard weight of 22.7 kg.

Figure 5-9 depicts the weight of TRU, HLW, and non-TRU waste stored in containers other than 55-gal drums on an annual basis. This graph shows the peaks in waste generation in 1974 and 1981-1983 associated with the disposal of HLW fuel pins in 1974 and the D&D of the PFDL and PAL between 1979 and 1982. Figure 5-10 shows the percent contribution of TRU, HLW, and non-TRU waste to the total weight of waste packaged in other containers.

5.1.2.3 Volume. The volume of waste received from VNC and packaged in containers other than 55-gal drums during the period from 1974 through 1983 is 668.6 m³. TRU wastes account for 556.3 m³ of the total volume, of which 109.5 m³ is HLW. Non-TRU wastes account for 112.3 m³.

Figure 5-11 shows annual volumes of TRU, HLW, and non-TRU waste generated by VNC and packaged in containers other than 55-gal drums. Figure 5-12 shows the relative contribution of TRU, HLW, and non-TRU waste to the total volume of waste in other containers for each year.

5.1.3 Summary of Waste Generation Rates at VNC Between 1974 and 1983

5.1.3.1 Number of Waste Containers. Between 1974 and 1983, there were 256 containers of radioactive solid waste generated at VNC. Of these containers, 65% were 55-gal drums; other containers account for the remaining 35%. Section 5.2, below, describes the container types used in greater detail.

Overall, waste designated as TRU is stored in about 84% of the containers generated between 1974 and 1983. Of the TRU waste, 10% of the containers are considered HLW. Non-TRU waste, mostly LLW, can be found in 16% of the containers. Figure 5-13 shows the total numbers of TRU, HLW, and non-TRU waste containers generated at VNC on an annual basis during this period.

5.1.3.2 Total Weight. More than 379,376 kg of the radioactive solid waste stored at the Hanford Site was generated at VNC between 1974 and 1983. Waste packaged in 55-gal drums accounts for about 6% of the total weight of waste from VNC, with 94% of the total weight comprised of waste packaged in some other types of waste container.

Waste designated as TRU comprises 92% of the total weight, while waste designated as non-TRU makes up the remainder. Of the TRU waste, 72% of the total weight is considered HLW. Figure 5-14 provides a graph of the total weight of TRU, HLW, and non-TRU waste generated at VNC on a yearly basis between 1974 and 1983.

5.1.3.3 Total Volume. In the period between 1974 and 1983, 703.8 m³ of the radioactive solid wastes stored at the Hanford Site were generated at VNC. Other containers make up 95% of this volume; the remaining 5% of the volume is comprised of 55-gal drums.

Waste designated as TRU accounts for the largest portion, 84%, of the total volume. Non-TRU waste accounts for the remaining 16% of the volume. Of the total volume, 15% is considered HLW. Figure 5-15 shows the total volume of TRU, HLW, and non-TRU waste generated at VNC between 1974 and 1983 on a yearly basis.

5.2 WASTE CONTAINERS

5.2.1 TRU Waste Containers

Table 5-1 provides a summary of the TRU waste generated annually at VNC from 1974 to 1983, sorted by container type. The greatest number of containers are 55-gal drums; however, the majority of the weight of waste is comprised of concrete boxes containing fuel pins. The percentages for all container types and the weight of these containers are shown for each year in this table.

5.2.2 Non-TRU Waste Containers

Table 5-2 provides a summary of the non-TRU waste sent to the Hanford Site by VNC from 1974 to 1983. This summary table is sorted by container type and year. Wooden boxes, cartons, and cases were the most common containers used, accounting for more than 60% of the total non-TRU waste count. The remainder of the storage containers used for non-TRU waste were metal drums, barrels, and kegs. The greatest weight of non-TRU waste, 93% is stored in wooden boxes, cartons, and cases.

5.3 TRU WASTE STORAGE LOCATIONS

Table 5-5 provides the storage locations for TRU waste packaged in 55-gal drums by year. All the drums were stored in a single location, 218-W-4C. Storage locations for TRU waste packaged in other containers are shown in Table 5-6. A summary of VNC TRU waste storage, by storage location, follows:

- **218-W-3A**

Burial Ground 218-W-3A consists of 14 earthen-bottom, gravel filled trenches, with waste emplaced from May 1970 to April 1988. In 1974, 22 concrete boxes containing fuel pins were put in this trench. A total of seven containers other than 55-gal drums were emplaced here in 1981 and 1982.

- **218-W-4C**

Burial Ground 218-W-4C consists of six trenches, with the first waste emplaced in March 1978. One-hundred fifty GE VNC TRU waste drums were sent to this area in 1981 and 1982, with 36 other TRU waste containers emplaced in 1982 and 1983. Waste containers reordered as having hazardous constituents were buried here in 1981 and 1982. The SWITS database listed contaminants are antifreeze, copper, and oil.

5.4 PHYSICAL CONTENTS OF TRU WASTE CONTAINERS

The physical contents for 55-gal drums of TRU waste stored in 218-W-4C are shown in Table 5-7. The top portion of each table indicates the number of drums for which a given component is listed; the bottom portion of the table indicates the percentage of the total drums generated in that year. It should be noted that prior to 1978, physical contents were not required to be listed on the burial records, so a great many of the contents on early records are listed only as "miscellaneous."

The physical contents for TRU waste containers other than 55-gal drums can be found in Tables 5-8 and 5-9.

5.5 RADIOLOGICAL DESCRIPTION OF VNC SOLID WASTE

Table 5-10 shows the number of grams of TRU elements stored in 55-gal drums each year by storage location; Table 5-11 provides the same information for TRU containers other than 55-gal drums. Figure 5-16 combines the information on these tables in a graph that shows the total grams of TRU in VNC waste packages sorted by year.

5.6 HAZARDOUS CONSTITUENTS OF SOLID WASTE GENERATED BY VNC

This section provides a review of the data on the hazardous components found in the SWITS database and on the original burial records. Because information on the nonradioactive, hazardous chemicals in waste containers was not required on burial records before 1987, information before that date is limited.

5.6.1 Solid Waste Information and Tracking System

Information about hazardous constituents of the solid waste from VNC is limited in the years before 1987 because of the recording and tracking practices of the time. According to the SWITS database, 86 pre-1987 drums from VNC are designated as MW accounting for 57% of the total drum count.

Table 5-12 presents the number of TRU MW drums stored in 218-W-4C by year. The contents of these MW containers are shown in Table 5-13.

5.6.2 Burial Records

The SWBR or SWSDR for a given container is the source of waste container information abstracted for the SWITS database. Often these records will have more detailed information on the hazardous components of a waste container than is found in SWITS. Additional data can also be found on the supplementary forms often attached to the SWBR or SWSDR. These supplementary documents include Uniform Hazardous Waste Manifests, Contents Inventory Sheets, NRC 741 Forms, and Storage/Disposal Approval Records (SDARs). Table 5-14 contains a summary of the information obtained from the burial records.

The following hazardous constituents were determined to be present in VNC waste stored at the Hanford Site: antifreeze, hydraulic fluid, lead, and asbestos.

The presence of asbestos-containing waste material was included in the summary tables despite the fact that it is not considered to be MW.

Figure 5-1. Number of 55-Gallon Drums Shipped to the Hanford Site by GE-VNC Annually.

06/04/83

Figure 5-3. Weight of 55-Gallon Drum Waste Shipped to the Hanford Site by GE-VNC by Year.

Figure 5-4. Weight Percentage of GE-VNC 55-Gallon Drums.

5-11

Figure 5-5. Volume of 55-Gallon Drum Waste Shipped to the Hanford Site by GE-VNC by Year.

Figure 5-7. Number of Other Containers of Waste Shipped to the Hanford Site by GE-VNC by Year.

50000-7-0100

Figure 5-8. Percentage of Other Containers Shipped to the Hanford Site by GE-VNC.

Figure 5-9. Weight of Other Containers Shipped to the Hanford Site by GE-VNC by Year.

Figure 5-10. Weight Percentage of Other Containers Shipped to the Hanford Site by GE-VNC.

Figure 5-11. Volume of Other Container Waste Shipped to the Hanford Site by GE-VNC by Year.

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Figure 5-12. Volume Percentage of Waste in Other Containers Shipped to the Hanford Site by GE-VNC.

Figure 5-13. Total Number of Waste Containers Shipped to the Hanford Site by GE-VNC by Year.

Figure 5-14. Total Weight of Waste Shipped to the Hanford Site by GE-VNC by Year.

88-04111-0004

Figure 5-15. Total Volume of Waste Shipped to the Hanford Site by GE-VNC by Year.

98-04118-0043

Figure 5-16. Grams of TRU Shipped to the Hanford Site by GE-VNC.

Table 5-1. TRU Waste Generated by General Electric - Vallecitos by Container Type and Year. (2 sheets)

Container Type	Container Size		Container Number	Percent of Total	Total Container Weight (kg)	Percent Weight	Volume (m³)	Percent Volume
	(m)	(ft)						
1974								
Concrete Boxes	3.4 m³	121 cu. ft	4	18.2%	32,658	12.9%	13.7	12.5%
	1.7x1.7x1.9 m	5.5x5.5x6.3	18	81.8%	220,445	87.1%	95.8	87.5%
Total			22		253,103		109.5	
1981								
Fiberglass Reinforced Polyester boxes	1.7x2.2x3.1 m	5.7x7.3x10.1	4	5.0%	7,228	39.4%	46.8	74.4%
Metal Drums, Barrels, or Kegs	55-gal*		52	65.0%	7,189	39.2%	11.0	17.5%
	55-gal		24	30.0%	3,934	21.4%	5.1	8.1%
Total			80		18,351		62.9	
1982								
Fiberglass Reinforced Polyester boxes	1.4x2.4x3.4	4.7x7.8x11	7	6.7%	12,531	19.9%	78.9	24.0%
	1.7x2.2x3.1	5.6x7.3x10	10	9.5%	17,806	28.2%	117.0	35.6%
	1.7x2.3x3.1	5.6x7.4x10.1	2	1.9%	3,901	6.2%	26.4	8.0%
	1.8x1.8x1.8	6x6x6	7	6.7%	11,313	17.9%	47.2	14.4%
	1.9x1.9x2.7	6.2x6.2x9	4	3.8%	7,131	11.3%	34.4	10.5%
	2.7x3.3x4.9	9x10.7x16	1	1.0%	1,983	3.1%	8.6	2.6%
Metal Drums, Barrels, or Kegs	55-gal*		34	32.4%	3,453	5.5%	7.2	2.2%
	55-gal		40	38.1%	5,000	7.9%	8.5	2.6%
Total			105		63,118		328.2	

Table 5-1. TRU Waste Generated by General Electric - Vallecitos by Container Type and Year. (2 sheets)

Container Type	Container Size		Container Number	Percent of Total	Total Container Weight (kg)	Percent Weight	Volume (m ³)	Percent Volume
	(m)	(ft)						
1983								
Fiberglass Reinforced Polyester boxes	0.9x2.4x1.3x3.8	3x8x4.3x12.5	1	12.5%	2,250	14.5%	5.8	6.6%
	1.4x2.4x3.4	4.7x7.8x11	4	50.0%	7,474	48.17%	45.1	51.5%
	1.7x2.2x3.1	5.6x7.3x10.1	2	25.0%	3,870	24.97%	23.4	26.7%
	1.7x2.2x3.4	5.6x7.3x11.3	1	12.5%	1,941	12.5%	13.2	15.1%
Total			8		15,535		87.5	

*These containers hold mixed waste.

Table 5-2. Non-TRU Waste Generated by General Electric - Vallecitos
by Container Type and Year.

Container Type	(m)	Container Size (ft)	Container Number	Percent of Total	Total Container Weight	Percent Weight	Volume	Percent Volume
1981								
Metal Drums, Barrels, or Kegs		55-gal	8	53.3%	884	10.8%	1.7	4.1%
Wooden Boxes, Cartons, and Cases	1.2x1.2x2.4	4x4x8	5	33.3%	2,963	36.1%	15.9	38.8%
	1.8x2.4x2.7	6x8x9	2	13.3%	4,370	53.2%	23.4	57.1%
Total			15		8,217		41.0	
1982								
Metal Drums, Barrels, or Kegs		*55-gal	8	30.8%	1,032	4.9%	1.7	2.3%
Wooden Boxes, Cartons, and Cases	0.9x0.9x1.2	3x3x4		3.8%	222	1.1%	1.1	1.5%
	0.9x1.7x1.8	3x5.6x6	1	3.8%	1,305	6.2%	3.0	4.0%
	1.2x1.2x1.2	4x4x4	1	3.8%	816	3.9%	1.8	2.4%
	1.2x1.2x1.5	4x4x5	1	3.8%	640	3.0%	2.4	3.2%
	1.2x1.2x2.4	4x4x8	10	38.5%	7,956	37.8%	31.7	42.4%
	1.2x1.8x2.4	4x6x8	1	3.8%	2,397	11.4%	5.4	7.2%
	1.2x2.4x3.1	4x8x10	1	3.8%	2,016	9.6%	8.7	11.6%
	1.5x1.8x3.1	5x6x10	1	3.8%	2,835	13.5%	8.5	11.4%
	1.8x1.8x3.1	6x6x10	1	3.8%	1,833	8.7%	10.4	13.9%
Total			26		21,052		74.7	

*These containers hold mixed waste.

Table 5-3. General Electric - Vallecitos Waste Summary Data for 55-Gallon Drums.

55-Gallon Drums	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
TRU count								76	74	
TRU wt (kg)								11,123	8,453	
TRU vol (m ³)								16.1	15.7	
TRU MW count								52	34	
Non-TRU count								8	8	
Non-TRU wt (kg)								884	1,032	
Non-TRU vol (m ³)								1.7	1.7	
Non-TRU MW count								0	8	
Percentage										
% TRU by count								90%	90%	
% non-TRU by count								10%	10%	
Wt % TRU								93%	89%	
Wt % non-TRU								7%	11%	
Vol % TRU								90%	90%	
Vol % non-TRU								10%	10%	
% of TRU Drums that are MW by count								68%	46%	
% of non-TRU Drums that are MW by count								0%	100%	

Table 5-4. General Electric - Vallecitos Waste Summary Data for Containers Other Than 55-Gallon Drums.

55-Gallon Drums	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
TRU Count	22							4	31	8
TRU Wt. (kg)	253,103							7,228	54,665	15,535
TRU Vol. (m ³)	109.5							46.8	312.5	87.5
TRU MW Count	0							0	0	0
Non-TRU Count	0							7	18	0
Non-TRU Wt. (kg)	0							7,333	20,020	0
Non-TRU Vol. (m ³)	0							39.3	73	0
Non-TRU MW Count	0							0	0	0
Percentage										
% TRU by Count	100%							36%	63%	100%
% non-TRU by Count	0%							64%	37%	0%
Wt. % TRU	100%							50%	73%	100%
Wt. % non-TRU	0%							50%	27%	0%
Vol. % TRU	100%							54%	81%	100%
Vol. % non-TRU	0%							46%	19%	0%
% of TRU containers that are MW by Count	0%							0%	0%	0%
% of non-TRU containers that are MW by Count	N/A							0%	0%	N/A

Table 5-5. General Electric - Vallecitos TRU Waste in 55-Gallon Drums:
Drum Count by Storage Location.

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
218-W-4C								76	74	

Table 5-6. General Electric - Vallecitos TRU Waste in Containers Other
Than 55-Gallon Drums: Container Count by Storage Location.

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
218-W-3A	22							4	3	
218-W-4C									28	8

Table 5-7. Distribution and Percentage of TRU Waste 55-Gallon Drums
Physical Contents by Storage Location - 218-W-4C. (2 sheets)

Distribution	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Aluminum								28	5	
Antifreeze								31		
Carborundum								21		
Cement									7	
Ceramics									5	
Concrete								22		
Copper Metal								28	5	
Cotton/Kotex								47	66	
Dirt/Soil/ Diatomaceous Earth								29	2	
Glass								29	5	
Insulation/Non-Asbestos								22		
Marble								1		
Metal/Iron/Galvanized/ Sheet								29	5	
Misc/Unknown/Other								32	42	
Molybdenum								29		
Oils								47	33	
Paints/Lucite									24	
Paper/Cardboard								47	67	
Plastic/Polyurethane								47	67	
Rubber								16	25	
Sand									5	
Stainless Steel								28	5	
Wood/Lumber/Plywood								47	67	

Table 5-7. Distribution and Percentage of TRU Waste 55-Gallon Drums
Physical Contents by Storage Location - 218-W-4C. (2 sheets)

Percentage			
Aluminum	37%	7%	
Antifreeze	41%		
Carborundum	28%		
Cement		9%	
Ceramics		7%	
Concrete	29%		
Copper Metal	37%	7%	
Cotton/Kotex	62%	89%	
Dirt/Soil/ Diatomaceous Earth	38%	3%	
Glass	38%	7%	
Insulation/Non-Asbestos	29%		
Marble	1%		
Metal/Iron/Galvanized/ Sheet	38%	7%	
Misc/Unknown/Other	42%	57%	
Molybdenum	38%		
Oils	62%	45%	
Paints/Lucite		32%	
Paper/Cardboard	62%	91%	
Plastic/Polyurethane	62%	91%	
Rubber	21%	34%	
Sand		7%	
Stainless Steel	37%	7%	
Wood/Lumber/Plywood	62%	91%	

**Table 5-8. Distribution and Percentage of TRU Containers Other Than 55-Gallon Drums:
Physical Contents by Storage Location - 218-W-3A.**

Distribution	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Metal/Iron/ Galvanized/Sheet								4	3	
Percentage										
Metal/Iron/ Galvanized/Sheet								100%	100%	

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**Table 5-9. Distribution and Percentage of TRU Containers Other Than 55-Gallon Drums:
Physical Contents by Storage Location - 218-W-4C.**

[illegible]

Table 5-10. General Electric - Vallecitos TRU Waste in 55-Gallon Drums:
Total Grams TRU by Storage Location.

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
218-W-4C								204.8	296.1	

Table 5-11. General Electric - Vallecitos TRU Waste in Containers Other Than 55-Gallon Drums:
Total Grams TRU by Storage Location.

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
218-W-3A	4703.5							0.3	0.1	
218-W-4C									2.5	0.8

Table 5-12. General Electric - Vallecitos TRU Mixed Waste in 55-Gallon Drums:
Drum Count by Storage Location.

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
218-W-4C								52	34	

Table 5-13. Distribution and Percentage of TRU 55-Gallon Drums:
Hazardous Constituents by Storage Location - 218-W-4C.

Distribution	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Antifreeze								30		
Copper								6	1	
Oil								47	33	
Percentage										
Antifreeze								39%		
Copper								8%	1%	
Oil								62%	45%	

Table 5-14. Summary of Information from Solid Waste Storage Disposal Records for TRU Wastes with Hazardous Contents from GE Vallecitos. (5 sheets)

Date Accepted	Pin Number	Burial Record Number	Hazardous Constituents	Waste Codes	Volume (%)
07/22/81	N55#2-39	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-40	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-41	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-42	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-43	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-44	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-45	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-46	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-47	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-48	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-49	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-50	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-51	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-52	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-53	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-54	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-55	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-56	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-57	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-58	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-59	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-60	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-61	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-62	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-63	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-64	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-65	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-66	GE-VAL-81-6	Antifreeze		4 *

Table 5-14. Summary of Information from Solid Waste Storage Disposal Records for TRU Wastes with Hazardous Contents from GE Vallecitos. (5 sheets)

Date Accepted	Pin Number	Burial Record Number	Hazardous Constituents	Waste Codes	Volume (%)
07/22/81	N55#2-67	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-68	GE-VAL-81-6	Antifreeze		4 *
07/22/81	N55#2-69	GE-VAL-81-6	Antifreeze		4 *
08/06/81	N55#2	GE-VAL-81-1	Antifreeze		4 *
08/06/81	N55#2	GE-VAL-81-2	Antifreeze		4 *
08/06/81	N55#2	GE-VAL-81-3	Antifreeze		4 *
08/06/81	N55#2	GE-VAL-81-4	Antifreeze		4 *
08/06/81	N55#2	GE-VAL-81-5	Antifreeze		4 *
08/06/81	N55#2	GE-VAL-81-6	Antifreeze		4 *
08/06/81	N55#2	GE-VAL-81-7	Antifreeze		4 *
03/29/82	RRM-3597-10-AB-177	GE-VAL-82-1	Hydraulic Fluid		
03/29/82	RRM-3597-10-AB-178	GE-VAL-82-1	Hydraulic Fluid		
03/29/82	RRM-3597-10-AB-179	GE-VAL-82-1	Hydraulic Fluid		
03/29/82	RRM-3597-10-AB-180	GE-VAL-82-1	Hydraulic Fluid		
03/29/82	RRM-3597-10-AB-181	GE-VAL-82-1	Hydraulic Fluid		
03/29/82	RRM-3597-10-AB-183	GE-VAL-82-1	Hydraulic Fluid		
03/29/82	RRM-3597-10-AB-184	GE-VAL-82-1	Hydraulic Fluid		
03/29/82	RRM-3597-10-AB-185	GE-VAL-82-1	Hydraulic Fluid		
03/29/82	RRM-3597-10-AB-186	GE-VAL-82-1	Hydraulic Fluid		
03/29/82	RRM-3597-10-AB-187	GE-VAL-82-1	Hydraulic Fluid		
03/30/82	RRM-3597-10-152	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-153	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-154	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-155	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-156	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-157	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-158	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-159	GE-VAL-82-2	Lead (Bricks)	D008	

Table 5-14. Summary of Information from Solid Waste Storage Disposal Records for TRU Wastes with Hazardous Contents from GE Vallecitos. (5 sheets)

Date Accepted	Pin Number	Burial Record Number	Hazardous Constituents	Waste Codes	Volume (%)
03/30/82	RRM-3597-10-160	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-161	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-162	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-163	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-164	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-165	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-166	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-167	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-168	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-169	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-170	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-171	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-172	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-173	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-174	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-175	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-176	GE-VAL-82-2	Lead (Bricks)	D008	
03/30/82	RRM-3597-10-182	GE-VAL-82-2	Lead (Bricks)	D008	
04/21/82	N55#3	GE-VAL-82-1	Hydraulic Fluid		
04/21/82	N55#3	GE-VAL-82-2	Hydraulic Fluid		
04/21/82	N55#3	GE-VAL-82-3	Hydraulic Fluid		
04/21/82	N55#3	GE-VAL-82-4	Hydraulic Fluid		
04/21/82	N55#3	GE-VAL-82-5	Hydraulic Fluid		
06/04/82	LSA#3-11	VAL-GE-82-2	Asbestos		
06/04/82	LSA#3-13	VAL-GE-82-2	Asbestos		
06/04/82	LSA#3-19	VAL-GE-82-2	Asbestos		
07/19/82	N55#3-35	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-36	VAL-GE-82-3	Hydraulic Fluid		

Table 5-14. Summary of Information from Solid Waste Storage Disposal Records for TRU Wastes with Hazardous Contents from GE Vallecitos. (5 sheets)

Date Accepted	Pin Number	Burial Record Number	Hazardous Constituents	Waste Codes	Volume (%)
07/19/82	N55#3-37	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-38	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-39	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-40	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-41	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-42	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-43	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-44	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-45	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-46	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-47	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-48	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-49	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-50	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-51	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-52	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-53	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-54	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-55	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-56	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-57	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-58	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-59	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-60	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-61	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-62	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-63	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-64	VAL-GE-82-3	Hydraulic Fluid		

Table 5-14. Summary of Information from Solid Waste Storage Disposal Records for TRU Wastes with Hazardous Contents from GE Vallecitos. (5 sheets)

Date Accepted	Pin Number	Burial Record Number	Hazardous Constituents	Waste Codes	Volume (%)
07/19/82	N55#3-65	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-66	VAL-GE-82-3	Hydraulic Fluid		
07/19/82	N55#3-67	VAL-GE-82-3	Hydraulic Fluid		

* Volume percents represent entire shipment, rather than individual containers.

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"GENERAL ELECTRIC FUELS LABORATORY DECONTAMINATION AND
DECOMMISSIONING" and GEFR-00616-2, THE APPENDICES TO
THE FORMER (Thompson et al. 1982a and 1982b)**

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2 of 4

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DATE July 1982

TITLE: GENERAL ELECTRIC FUELS LABORATORY
DECONTAMINATION AND DECOMMISSIONING APPENDICES

AUTHORS: Marion L. Thompson
Edward F. Kurtz
George C. Berg

Prepared for the
United States Department of Energy
Under Contract No. DE-AT03-
76 SF 71026

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GENERAL ELECTRIC

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 - 908E588 Piping Assembly - Powder Collector
 - 197F875 Four Way Ball Valve w/Air Cylinder
 - 197F876 Manifold Assembly - Powder Collector
 - 197F878 Clamp Assembly - Powder Collector
 - 197F879 Tubing Details - Powder Collector
 - 197F880 Powder Collector Details
- 908E582 Calciner Assembly
 - 908E584 Calciner Details
 - 908E589 Vessel Assembly - Calciner
- 908E580 Feed Nozzle Assembly - Calciner
 - 908E581 Feed Nozzle Details - Calciner

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- 908E610 Scrubber Assembly
 - 179C4748 Spool - Scrubber Assembly
 - 179C4755 Bottom Flange Detail
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- 908E611 Precipitator Assembly
 - 908E612 Precipitator Details
 - 908E613 Precipitator Details
- 908E609 Reduction Vessel Assembly
 - 145D6081 Reflector Detail - Reduction Vessel
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- 215E2449 Furnace Assembly (Purchased Part)

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Appendix H.	WORK PLAN

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**PLUTONIUM FUEL DEVELOPMENT
UNIT OPERATIONAL GLOVEBOX LINES**

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APPENDIX C

**FAST CERAMIC REACTOR PROGRAM SOLID WASTE:
SHIPPING AND BURIAL DATA AND LINER
FABRICATION DRAWINGS**

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Table C-1. Shipment Where Information Came From or Derived From/
Burial Summary for FCR Wastes. (4 sheets)

Load No.	Date Received	G.E. Liner No.	Date Loaded In Burial Container	Burial Container No.	Burial Container Position	Date Shipped To Burial Ground	Burial Ground Coordinates
1	2-25-74	606	5-16-74	14	B	6-28-74	#14 B.G. 3A Trench #3
1	2-25-74	501	5-16-74	14	A	6-28-74	N 44660, W 77440
1	2-25-74	600	5-9-74	12	D	5-10-74	#12 B.G. 3A Trench #8
1	2-25-74	643	5-9-74	12	C	5-10-74	N 44660, W 77304
1	2-25-74	734	5-9-74	12	B	5-10-74	
2	3-6-74	614	5-9-74	12	A	5-10-74	
2	3-6-74	502	5-9-74	11	D	5-10-74	#11 B.G. 3A Trench #8
2	3-6-74	607	5-9-74	11	C	5-10-74	N 44660, W 77304
2	3-6-74	605	5-9-74	11	B	5-10-74	
2	3-6-74	723	5-9-74	11	A	5-10-74	
3	3-13-74	492	5-7-74	10	D	5-10-74	#10 B.G. 3A Trench #8
3	3-13-74	630	5-7-74	10	C	5-10-74	N 44660, W 77304
3	3-13-74	632	5-7-74	10	B	5-10-74	
3	3-13-74	562	5-7-74	10	A	5-10-74	
3	3-13-74	633	5-7-74	9	D	5-10-74	
4	3-20-74	718	5-7-74	9	C	5-10-74	#9 B.G. 3A Trench #8
4	3-20-74	694	5-7-74	9	B	5-10-74	N 44660, W 77304
4	3-20-74	612	5-7-74	9	A	5-10-74	
4	3-20-74	698	5-3-74	8	D	5-7-74	#8 B.G. 3A Trench #8
4	3-20-74	609	5-3-74	8	C	5-7-74	N 44660, W 77282
4	3-20-74	692	5-3-74	8	B	5-7-74	
4	3-20-74	659	5-3-74	8	A	5-7-74	

Table C-1. Shipment Where Information Came From or Derived From/
Burial Summary for FCR Wastes. (4 sheets)

Load No.	Date Received	G.E. Liner No.	Date Loaded in Burial Container	Burial Container No.	Burial Container Position	Date Shipped To Burial Ground	Burial Ground Coordinates
5	3-27-74	673	5-2-74	7	B	5-6-74	#7 B.G. 3A Trench #8
5	3-27-74	686	5-2-74	7	C	5-6-74	N 44660, W 77256
5	3-27-74	684	5-1-74	6	C	5-6-74	#6 B.G. 3A Trench #8
5	3-27-74	626	5-1-74	6	B	5-6-74	N 44660, W 77256
5	3-27-74	657	5-1-74	6	D	5-6-74	
5	3-27-74	615	5-1-74	6	A	5-6-74	
5	3-27-74	682	5-2-74	7	D	5-6-74	
6	4-3-74	676	5-2-74	7	A	5-6-74	
6	4-3-74	642	4-18-74	4	B	4-29-74	#4 B.G. 3A Trench #8
6	4-3-74	685	4-18-74	4	A	4-29-74	N 44660, W 77225
6	4-3-74	603	4-18-74	4	C	4-29-74	
6	4-3-74	504	4-25-74	2	D	4-26-74	#2 B.G. 3A Trench #8
6	4-3-74	689	4-15-74	2	C	4-26-74	N 44660, W 77170
6	4-3-74	679	4-15-74	2	B	4-26-74	
7	4-10-74	726	4-15-74	1	A	4-26-74	#1 B.G. 3A Trench #8
7	4-10-74	681	4-15-74	1	B	4-26-74	N 44660, W 77170
7	4-10-74	722	4-15-74	1	C	4-26-74	
7	4-10-74	693	4-15-74	1	D	4-26-74	
7	4-10-74	683	4-15-74	2	A	4-26-74	See #2 above
8	4-17-74	583	4-18-74	3	B	4-26-74	#3 B.G. 3A Trench #8
8	4-17-74	667	4-18-74	3	D	4-26-74	N 44660, W 77170
8	4-17-74	706	4-18-74	3	A	4-26-74	
8	4-17-74	707	4-18-74	3	C	4-26-74	
8	4-17-74	711	4-18-74	4	D	4-29-74	See #4 above

Table C-1. Shipment Where Information Came From or Derived From/
Burial Summary for FCR Wastes. (4 sheets)

Load No.	Date Received	G.E. Liner No.	Date Loaded In Burial Container	Burial Container No.	Burial Container Position	Date Shipped To Burial Ground	Burial Ground Coordinates
9	4-24-74	695	4-25-74	5	A	4-29-74	#5 B.G. 3A Trench #8
9	4-24-74	716	4-25-74	5	B	4-29-74	N 44660, W 77225
9	4-24-74	690	4-25-74	5	C	4-29-74	
9	4-24-74	724	4-25-74	5	D	4-29-74	
10	5-1-74	1010	5-16-74	21	D	5-17-74	#21 B.G. 3A Trench #8
10	5-1-74	1039	5-16-74	21	C	5-17-74	N 44660, W 77346
10	5-1-74	1043	5-16-74	21	B	5-17-74	
10	5-1-74	1021	5-16-74	21	A	5-17-74	
11	5-7-74	1027	5-15-74	20	A	5-17-74	#20 B.G. 3A Trench #8
11	5-7-74	1032	5-15-74	20	B	5-17-74	N 44660, W 77346
11	5-7-74	1051	5-15-74	20	C	5-17-74	
11	5-7-74	1033	5-15-74	20	D	5-17-74	
12	5-15-74	752	5-15-74	13	A	5-17-74	#13 B.G. 3A Trench #8
12	5-15-74	696	5-15-74	13	B	5-17-74	N 44660, W 77346
12	5-15-74	727	5-15-74	13	C	5-17-74	
12	5-15-74	742	5-15-74	13	D	5-17-74	
13	5-22-74	1052	5-22-74	23	A	6-3-74	#23 B.G. 3A Trench #8
13	5-22-74	1038	5-22-74	23	B	6-3-74	N 44660, W 77371
13	5-22-74	1036	5-22-74	23	C	6-3-74	
13	5-22-74	1034	5-22-74	23	D	6-3-74	
14	5-30-74	741	5-30-74	15	A	6-3-74	#15 B.G. 3A Trench #8
14	5-30-74	763	5-30-74	15	B	6-3-74	N 44660, W 77371

**Table C-1. Shipment Where Information Came From or Derived From/
Burial Summary for FCR Wastes. (4 sheets)**

Load No.	Date Received	G.E. Liner No.	Date Loaded In Burial Container	Burial Container No.	Burial Container Position	Date Shipped To Burial Ground	Burial Ground Coordinates
14	5-30-74	747	5-30-74	15	C	6-3-74	
14	5-30-74	746	5-30-74	15	D	6-3-74	
15	6-5-74	764	6-5-74	16	A	6-21-74	#16 B.G. 3A Trench #8
15	6-5-74	765	6-5-74	16	B	6-21-74	N 44660, W 77410
15	6-5-74	766	6-5-74	16	C	6-21-74	
15	6-5-74	767	6-5-74	16	D	6-21-74	
16	6-12-74	762	6-12-74	18	A	6-21-74	#18 B.G. 3A Trench #8
16	6-12-74	768	6-12-74	18	B	6-21-74	N 44660, W 77410
16	6-12-74	769	6-12-74	18	C	6-21-74	
16	6-12-74	770	6-12-74	18	D	6-21-74	
17	6-19-74	1012	6-19-74	22	A	6-21-74	#22 B.G. 3A Trench #8
17	6-19-74	1031	6-19-74	22	B	6-21-74	N 44660, W 77410
17	6-19-74	1040	6-19-74	22	C	6-21-74	
17	6-19-74	1050	6-19-74	22	D	6-21-74	
18	6-26-74	760	6-26-74	17	A	6-23-74	#17 B.G. 3A Trench #8
18	6-26-74	629	6-26-74	17	B	6-28-74	N 44660, W 77440
18	6-26-74	717	6-26-74	17	C	6-28-74	
18	6-26-74	704	6-26-74	17	D	6-28-74	
18	6-26-74	577	6-26-74	14	C	6-28-74	See #14 above

6. "G" DEPTH MAY BE MACHINED $3/32$
OVER NOMINAL PIPE ID. TO ACCEPT
AND LOCATE P3 $32/$
 5. NO CHATTER MARKS ALLOWED ON $\checkmark$ SURFACES
 4. PER ALL GSK & ENRI LINES
 3. DE CURT TAIL END
 2. THREADS MUST BE 4.0000 IN.
 1. ALL WELLS ABRAZE MUST BE LEAK TIGHT
TO A SENSITIVITY OF 1×10^{-3} ATM CM^{-3} AIR/SEC.
- 1/0-55:

TITLE _____ CONT ON SHEET _____ OF _____
 "5" INNER STORAGE CONTAINER
 FIRST MADE FOR EML (Feb. 12, 1964 - "JULY 1964")

k or equal

135C5551

WASTE LINER

$$-\frac{5}{16} \pm \frac{1}{64}$$

135C5551	REV NO	Rev. 1/1	Dr. King
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4	5	6	CH'KD. 57/66
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APPENDIX D

PACKAGING AND SHIPPING CONTAINER PHOTOGRAPHS

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Figure D-1. 55-Gallon 17C Drum Loading.

Figure D-2. Sealed 55-Gallon 17C Drum.

Figure D-3. Glass Tank Loading.

Figure D-4. Foam Application to Loaded Equipment.

Figure D-5. Foamed Shipping Package for Super Tiger Shipment.

Figure D-6. N-55 Drum Overpack.

Figure D-7. Partially Loaded Model 9136 Shipping Package
for Flatbed Truck Shipment.

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APPENDIX E

**SPECIAL NUCLEAR MATERIAL QUANTITIES FOR PLUTONIUM FUELS DEVELOPMENT
LABORATORY DRUM AND LLS/9136 CONTAINER SHIPMENTS**

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**Special Nuclear Material Quantities for Plutonium Fuels Development Laboratory
Drum and LLS/9136 Container Shipments.**

Drum No.	Can No.	Activity (Ci)	Pu (g)	U (g)	Volume (ft ³)	Weight (lb)
N-55 Overpack Drum Shipment No. 1						
1082	12105	2.51	1.65	5.29	7.5	225
1083	12111	19.98	13.15	42.21	7.5	450
1091	12104	0.04	0.02	0.07	7.5	222
1096	12129	6.81	4.48	14.38	7.5	231
1103	12136	1.56	1.02	3.33	7.5	378
1104	12149	8.71	5.65	15.89	7.5	174
1111	12143	0.62	0.41	1.33	7.5	185
1116	12148	1.49	0.97	2.97	7.5	186
1132	12162	1.31	0.84	2.77	7.5	246
1133	12163	5.70	3.76	11.97	7.5	231
1135	12165	4.37	2.87	9.21	7.5	231
1136	12166	1.79	1.19	3.82	7.5	240
1137	12167	0.47	0.31	1.00	7.5	34
1138	12168	0.47	0.31	1.00	7.5	338
1141	12172	2.92	1.94	6.28	7.5	187
1143	12173	1.59	1.23	3.14	7.5	167
1144	12174	1.38	0.92	2.90	7.5	308
1145	12175	3.32	2.17	6.95	7.5	306
1146	12176	7.85	4.95	10.94	7.5	214
1147	12177	4.88	2.94	1.47	7.5	421
1148	12181	3.28	1.94	0.19	7.5	235
1149	12183	2.49	1.48	0.07	7.5	387
1151	12184	4.10	2.46	1.02	7.5	191
1152	12185	1.47	0.87	0.00	7.5	383
1153	12186	2.14	1.31	0.12	7.5	389
1154	12188	3.66	2.13	0.00	7.5	471
1155	12189	0.18	0.11	0.00	7.5	234
1156	12190	4.06	2.39	0.04	7.5	344

**Special Nuclear Material Quantities for Plutonium Fuels Development Laboratory
Drum and LLS/9136 Container Shipments.**

Drum No.	Can No.	Activity (Ci)	Pu (g)	U (g)	Volume (ft³)	Weight (lb)
1157	12191	1.63	0.96	0.00	7.5	323
1163	12197	9.73	5.75	1.24	7.5	273
1165	12199	2.04	1.26	1.95	7.5	397
1166	12200	6.01	3.63	3.12	7.5	269
1168	12202	1.14	0.72	1.68	7.5	412
1172	12206	0.37	0.24	0.53	7.5	295
1173	12207	2.12	1.19	0.30	7.5	302
1175	12209	1.59	0.94	0.10	7.5	346
1181	12215	19.99	13.16	42.21	7.5	331
1184	12226	0.68	0.41	0.04	7.5	168
Totals	38	144.45	91.73 [80.85] [Fiss.]	199.53 (Nat)	285.0	11,030
N-55 Overpack Drum Shipment No. 2						
1084	12113	2.62	1.71	5.52	7.5	280
1085	12114	8.62	6.01	16.07	7.5	344
1086	12115	2.86	1.86	6.04	7.5	364
1087	12116	8.25	5.38	17.22	7.5	257
1088	12117	8.86	5.83	10,758.16	7.5	421
1089	1211	1.21	0.79	7,100.59	7.5	469
1092	12125	2.52	1.64	5.25	7.5	337
1095	12127	7.53	4.96	15.92	7.5	273
1097	12131	0.81	0.54	1.72	7.5	309
1098	12132	0.17	0.11	0.37	7.5	440
1099	12138	0.17	0.11	0.37	7.5	245
1100	12133	0.21	0.14	0.44	7.5	500
1102	12135	3.70	2.43	7.82	7.5	256
1125	12151	1.92	1.24	3.27	7.5	417
1127	12154	0.80	0.53	1.70	7.5	485
1128	12158	0.61	0.38	1.23	7.5	507

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Special Nuclear Material Quantities for Plutonium Fuels Development Laboratory
Drum and LLS/9136 Container Shipments.

Drum No.	Can No.	Activity (Ci)	Pu (g)	U (g)	Volume (ft ³)	Weight (lb)
1129	12159	0.47	0.30	0.93	7.5	536
1130	12160	0.47	0.30	0.93	7.5	474
1131	12161	3.49	2.27	6.88	7.5	170
1134	12164	3.48	2.15	7.34	7.5	165
1142	12180	0.44	0.29	0.92	7.5	448
1150	12182	11.17	7.35	23.58	7.5	520
1158	12192	0.25	0.17	0.54	7.5	249
1159	12195	1.99	1.30	4.20	7.5	507
1160	12193	0.45	0.30	0.96	7.5	278
1161	12194	0.66	0.44	1.42	7.5	351
1162	12196	6.71	4.40	14.20	7.5	355
1164	12198	5.58	3.68	11.76	7.5	179
1167	12201	12.50	7.48	3.91	7.5	381
1169	12203	0.70	0.46	1.21	7.5	185
1170	12204	11.13	7.40	22.21	7.5	326
1174	12208	0.41	0.27	0.89	7.5	190
1176	12210	19.73	12.51	26.47	7.5	304
1177	12211	0.93	0.60	1.79	7.5	267
1179	12213	13.27	7.36	18.76	7.5	381
1180	12214	10.05	6.61	192.91	7.5	428
1182	12224	0.29	0.20	0.62	7.5	265
1187	12229	19.97	13.76	35.87	7.5	423
Totals	38	175.20	113.26 [95.80] [Fiss]	18,319.99 (Nat/Dep)	285.0	13,286

**Special Nuclear Material Quantities for Plutonium Fuels Development Laboratory
Drum and LLS/9136 Container Shipments.**

Drum No.	Can No.	Activity (Ci)	Pu (g)	U (g)	Volume (ft ³)	Weight (lb)
N-55 Overpack Drum Shipment No. 3						
1139	12169	1.56	1.03	3.33	7.5	549
1171	12205	16.37	10.91	34.69	7.5	492
1183	12225	5.16	3.39	10.88	7.5	266
1185	12227	9.78	6.45	20.64	7.5	441
1186	12228	6.22	4.11	13.16	7.5	299
1188	12223	17.49	12.14	30.44	7.5	326
1189	12231	19.5	13.08	42.12	7.5	351
1190	12232	1.04	0.69	8,300.20	7.5	507
1191	12233	0.69	0.44	1.49	7.5	569*
1192	12234	19.95	13.95	42.08	7.5	225
1193	12238	19.7	11.75	0.00	7.5	137
1195	12237	16.05	9.66	6.54	7.5	514
1196	12239	17.41	11.46	36.75	7.5	249
1197	12240	16.49	9.72	0.15	7.5	183
1198	12241	3.15	2.07	6.61	7.5	340
1199	12242	0.35	0.22	0.74	7.5	245
1200	12243	13.31	7.84	0.40	7.5	194
1201	12245	0.89	0.58	1.88	7.5	273
1202	12244	17.57	10.69	10.49	7.5	498
1204	12247	0.80	0.52	1.42	7.5	254
1205	12248	0.14	0.09	0.30	7.5	168
1206	12249	0.32	0.20	0.65	7.5	183
1207	12250	0.02	0.01	0.04	7.5	150
1208	12251	0.04	0.03	0.08	7.5	174
1209	12252	1.12	0.74	2.37	7.5	483
1210	12253	1.09	0.71	2.29	7.5	161
1211	12254	<0.01	<0.01	8.81	7.5	441
1212	12255	0.25	0.17	0.53	7.5	196

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**Special Nuclear Material Quantities for Plutonium Fuels Development Laboratory
Drum and LLS/9136 Container Shipments.**

Drum No.	Can No.	Activity (Ci)	Pu (g)	U (g)	Volume (ft³)	Weight (lb)
1213	12256	0.41	0.27	0.87	7.5	284
1214	12257	1.71	1.11	3.60	7.5	264
1215	1225	0.07	0.04	0.12	7.5	154
1216	12260	0.05	0.04	13,277.98	7.5	179
1217	12261	<0.01	0.00	12,994.47	7.5	225
1219	12242	<0.01	0.00	13,037.67	7.5	176
1221	12263	0.63	0.42	1.32	7.5	333
1222	12265	0.76	0.51	13,003.68	7.5	180
1223	12266	0.06	0.03	12,936.07	7.5	243
1224	12267	0.07	0.04	0.13	7.5	278
TOTALS	38	210.94	134.28 [118.84] [Fiss]	73,834.99 (Nat)	285.0	11,184
N-55 Overpack Drum Shipment No. 4						
1090	12119 12124	12124	4.89	3.12	7.5	476
1093	12126	0.05	0.03	0.00	7.5	180
1094	12128	0.02	0.01	0.00	7.5	224
1101	12134	1.16	0.68	0.00	7.5	132
1107	12139	0.60	0.32	0.00	7.5	210
1108	12140	0.60	0.35	0.00	7.5	280
1109	12141	0.95	0.55	0.00	7.5	320
1110	12142	0.55	0.32	0.00	7.5	222
1112	12144	4.08	2.40	0.00	7.5	200
1113	12145	0.49	0.29	0.00	7.5	175
1114	12146	0.08	0.05	0.00	7.5	300
1115	12147	0.23	0.13	0.00	7.5	265
1124	12150	0.05	0.03	0.00	7.5	176
1126	12153	0.11	0.07	0.00	7.5	165
1218	12120	0.45	3.25	0.00	7.5	165

**Special Nuclear Material Quantities for Plutonium Fuels Development Laboratory
Drum and LLS/9136 Container Shipments.**

Drum No.	Can No.	Activity (Ci)	Pu (g)	U (g)	Volume (ft³)	Weight (lb)
1140	12170	0.44	0.29	944.98	7.5	553*
1178	12212	18.81	15.62	46.96	7.5	452
1194	12234	0.65	0.42	1.38	7.5	492
1203	12246	0.77	0.47	1.06	7.5	168
1220	12264	0.33	0.21	0.69	7.5	357
1225	12269	2.15	1.15	43.89	7.5	178
1226	12270 12271	19.34	6.14	150.28	7.5	212
1227	12272 12273	17.67	0.54	248.88	7.5	183
1228	12274 12275	12.39	6.65	247.60	7.5	223
1229	10888	0.84	0.33	0.00	7.5	207
1230	N/A	<0.01	<0.01	0.00	7.5	172
1231	N/A	<0.01	<0.01	0.00	7.5	176
1232	N/A	<0.01	<0.01	0.00	7.5	179
1233	M/A	<0.01	<0.01	0.00	7.5	165
1234	N/A	<0.01	<0.01	0.00	7.5	152
1235	N/A	<0.01	<0.01	0.00	7.5	163
1236	N/A	<0.01	<0.01	0.00	7.5	152
1237	N/A	<0.01	<0.01	0.00	7.5	165
1238	M/A	<0.01	<0.01	0.00	7.5	165
1239	N/A	<0.01	<0.01	0.00	7.5	161
1240	10896	4.30	2.30	87.72	7.5	399
Totals	36	92.00	52.72 (47.59) [Fiss]	1,779.79 (Nat)	270.0	8,564

*Overweight drum, NRC waiver obtained.

NOTE: Total TRU in all drum shipments was approximately 392 grams plutonium and 94 kg uranium (nat/dep)

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LLS and 9136 Container Shipments. (2 sheets)

Equipment Number	Container S/N	Total Cl	$\mu\text{Cl}/\text{cm}^2$	Total Grams	
				Pu	U
42	361	0.086	0.52	0.052	0.167
43	377	0.134	0.80	0.081	0.259
29	362	0.151	1.46	0.090	0.291
27	358	0.07	0.12	0.004	0.014
51B	370	<0.01	<0.01	<0.01	<0.01
37	378	0.130	0.78	0.078	0.252
41	376	0.073	0.40	0.048	0.155
38	360	0.055	0.33	0.033	0.106
44	364	0.056	0.34	0.037	0.119
35	359	0.035	0.34	0.023	0.074
39	381	0.092	0.49	0.060	0.195
40	382	0.500	8.16	0.329	1.055
30/32	379	0.097	1.64	0.064	0.205
31	371	0.087	1.26	0.057	0.184
50-1E	368	0.050	0.35	0.035	0.113
50-2M	373	0.032	0.25	0.021	0.067
50-3M	366	0.071	0.54	0.046	0.149
50-4W	374	0.043	0.29	0.028	0.092
51-1E	365	0.145	0.98	0.095	0.306
51-2M	380	0.079	1.26	0.052	0.166
51-3M	367	0.245	1.94	0.161	0.519
51-4M	372	0.127	0.98	0.084	0.270
51-5W	369	0.055	0.5	0.036	0.118
50A	375	<0.01	<0.01	<0.01	<0.01
51C	383	0.103	0.74	0.068	0.218
Hyd Res. (2)	392	0.38	17.35	0.250	0.802
31 DT/HX	386	<0.01	<0.01	<0.01	<0.01
Glass/Duct	388	1.550	4.56	1.03	3.18
7	384	0.142	2.65	0.093	0.300

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LLS and 9138 Container Shipments. (2 sheets)

Equipment Number	Container S/N	Total CI	$\mu\text{Ci/cm}^2$	Total Grams	
				Pu	U
22H	385	0.007	<0.01	0.004	0.015
Tun/Filt	387	0.340	3.71	0.012	2.980
FL Filt	390	0.182	22.75	0.106	0.384
BL Tilt	391	0.182	22.75	0.106	0.384
S Duct	389	<0.01	<0.01	<0.01	<0.01
C Duct	393	<0.01	<0.01	<0.01	<0.01
Filt/Misc.	395	0.34	6.03	0.223	0.718
Totals		5.576		3.406	13.85

APPENDIX F

**PHOTOGRAPHS OF THE GENERAL GLOVEBOX
CONFIGURATIONS AND ANCILLARY VENTILATION**

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Table F-1. Summary of P.A.L. Glovebox Dimensions.

Box	Height cm (in)	Length cm (in)	Width cm (in)	Group
10	15 (48)	120.65 (47.5)	84 (33)	I
103	141.0 (55.5)	216 (85)	89 (35)	I
106	157 (62)	278.1 (109.5)	119 (47)	III
107	188 (74)	280.7 (110.5)	107 (42)	I
101	186.7 (73.5)	282 (111)	104 (41)	I
102	186.7 (73.5)	272 (107)	104 (41)	I

Table F-2. P.A.L. Glovebox Measurements. (2 sheets)

		Box 10	Box 103	Box 106	Box 107	Box 101	Box 102
		cm	(in)	cm	(in)	cm	(in)
Height							
1. Metal box only		77.5	30.5	122	48	152	60
2. Top Projections	a. magnehelic	30.5	12	6.35	2.5	18	7
	b. exhaust manifold	24.1	9.5	16.5	6.5	19.05	7.5
	c. window	2.5	1	2.5	1	2.5	1
	d. air intake tube	31.75	12.5	-	-	-	-
	e. junction box	-	-	5	2	-	-
3. Bottom projections	a. studs	-	-	2.5	1	2.5	1
	b. port	8	3	-	-	-	-
*Items are to be removed from the glovebox.							
Length							
1. Metal box only		91	36	183	72	244	96
2. Projections on left	a. small ports	8	3	5	2	5	2
	b. 18-in. port	-	-	8	3	8	3
	c. sphincter port	-	-	19.05	7.5	19.05	7.5
	d. filter housing	-	-	-	-	14	5.5
	e. junction box	-	-	5	2	6.35	2.5

Table F-2. P.A.L. Glovebox Measurements. (2 sheets)

	Box 10 cm	(in)	Box 103 cm	(in)	Box 106 cm	(in)	Box 107 cm	(in)	Box 101 cm	(in)	Box 102 cm	(in)
f. tubes	-	-	-	-	-	-	-	-	114	45	-	-
3. Projections on right	-	-	5	2	5.715	2.25	5.715	2.25	5	2	-	-
b. 18" port	-	-	8	3	-	-	8	3	8	3	8.9	3.5
c. sphincter port	21.6	8.5	-	-	-	-	18	7	18	7	8	3
d. filter housing	-	-	14	5.5	-	-	-	-	-	-	-	-
e. junction box	-	-	6.35	2.5	5	2	5	2	5	2	5	2
f. tubes	15	6	-	-	15	6	-	-	10	4	10	4
Width												
1. Metal box only	66	26	76	30	61	24	91	36	91	36	91	36
2. Projections on front	6.35	2.5	8	3	8	3	8	3	8	3	8	3
3. Projections on back	5	2	5	2	5	2	-	-	5	2	5	2
b. exhaust	11.4	4.5	-	-	-	-	-	-	-	-	-	-
c. angle iron	-	-	2.5	1	5	2	-	-	-	-	-	-
d. air lock	-	-	-	-	51	20	-	-	-	-	-	-
e. window & ports	-	-	-	-	-	-	8	3	-	-	-	-
f. port	-	-	-	-	6.35	2.5	-	-	-	-	-	-

GENERAL ELECTRIC CO.
Nuclear Energy Business Group
ENGINEERING CALCULATION SHEET

NUMBER _____ DATE 10-5-81
SUBJECT P.A.L. GLOVEBOX EXHAUST SYSTEM BY C.R. JUDD SHEET 1 OF 1
and D. BOZMAN

PVC DUCTING -
SOUTHERLY SIDE OF LAB

FILTER

PVC DUCTING - NORTHERLY SIDE OF P.A.L.

GENERAL ELECTRIC CO.
Nuclear Energy Business Group
ENGINEERING CALCULATION SHEET

NUMBER _____ DATE 10-5-81
SUBJECT PAL GLOVEBOX 101 BY D. BOZMAN SHEET 1 OF 1
C. JUBB

↑
Box
103

Box 101
FRONT

↑
Box
102

TOP RIGHT
Box 101

Box
101

↑
Box
102

GENERAL ELECTRIC CO.
Nuclear Energy Business Group
ENGINEERING CALCULATION SHEET

NUMBER _____ DATE _____
SUBJECT P.A.L. GLOVEBOX 102 BY D. BOZMAN SHEET 1 OF 1
and C. Judd

LEFT SIDE
Box 102

FRONT
Box 102

Box
102

Box
10

Box 102
TOP RIGHT
(BACKGROUND: BOX 101)

Box 102

GENERAL ELECTRIC CO.
Nuclear Energy Business Group
ENGINEERING CALCULATION SHEET

NUMBER _____
SUBJECT PAL GLOVEBOX 103

DATE 10-5-81
BY D. BOZMAN SHEET 1 OF 2
AND C. JUBB

Box 103 LEFT SIDE

Box 103 TOP

Box 103 FRONT

Box 103
RIGHT SIDE

Box
101

WHC-EP-0672

GENERAL ELECTRIC CO.
Nuclear Energy Business Group
ENGINEERING CALCULATION SHEET

NUMBER _____ DATE 10-5-81
SUBJECT P.A.L. GLOVE BOX 103 BY D. BOZMAN SHEET 2 OF 2
and C. Judd

Box 103
RIGHT REAR CORNER

GENERAL ELECTRIC CO.
Nuclear Energy Business Group
ENGINEERING CALCULATION SHEET

NUMBER _____ DATE 10-5-81
SUBJECT PAL GLOVEBOX 106 BY D. BOZMAN SHEET 1 OF 1
and C. JUDD

Box 106 LEFT AND FRONT
SIDES

Box 106
TOP AND RIGHT SIDES

Box 106
REAR AND LEFT SIDES

Box 106
RIGHT AND REAR SIDES

GENERAL ELECTRIC CO.
Nuclear Energy Business Group
ENGINEERING CALCULATION SHEET

NUMBER DOUBLE-SIDED BOX
SUBJECT P.A.L. GLOVEBOX 107

DATE 10-5-81

LEFT SIDE
Box 107

FRONT

RIGHT SIDE
Box 107

REAR

TOP RIGHT
Box 107

RIGHT SIDE
Box 107

Box
106

GENERAL ELECTRIC CO.
Nuclear Energy Business Group
ENGINEERING CALCULATION SHEET

NUMBER _____ DATE 10-5-81
SUBJECT P.A.L. GLOVEBOX 10 BY D. BOZMAN SHEET 1 OF 2
and C. JUDD

Box 102

Box 10
LEFT SIDE

Box 10
FRONT

Box
102

Box 10
RIGHT SIDE

GENERAL ELECTRIC CO.
Nuclear Energy Business Group
ENGINEERING CALCULATION SHEET

NUMBER _____ DATE 10-5-81
SUBJECT P.A.L. GLOVEBOX 10 BY C. JUDD SHEET 2 OF 2
D. BOZMAN

BOX 10
RIGHT REAR
CORNER

NOTE PORT ON
BOTTOM.

BOX 10
RIGHT REAR CORNER

↑ BOX 102

APPENDIX G

**TECHNICAL DATA SHEETS, MATERIAL SAFETY DATA SHEETS,
AND FIRE TESTING DATA FOR INSTAPAK
FOAM-IN PLACE CHEMICALS**

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Technical Data Sheet

INSTAPAK®

 SEALED AIR CORPORATION
 Old Sherman Turnpike
 Danbury, Connecticut 06810
 (203) 792-2360

P10-3

INSTAPAK-200 RIGID BLOCKING AND BRACING PACKAGING FOAM

CHEMICAL CHARACTERISTICS

	Component 'A'	Component 'B'
Composition	Polymeric Isocyanate (Polyarylene Polyisocyanate)	Polyurethane Resin
Storage Temperature Range	20-100°F	20-100°F
Optimum Temperature Range for Containers at Time of Use	60-90°F	60-80°F
Flash Point*	415°F	Approximately 400°F

*At over 80°F containers will be under pressure - Open with care!

If 'B' component freezes, it can be thawed without adverse effect. (Do not apply heat source - Allow to warm in normal ambient temperature.)

AVERAGE PERFORMANCE CHARACTERISTICS

Cream time	Immediate
Rise time	35 Seconds
Tack free time	45 Seconds
Demold time after closing mold	2-5 Minutes
Expansion (liquid to foam volume)	Over 30 Times
Free rise core density, pounds per cubic foot	2.0 pcf
Compressive strength, nominal	30 psi
K factor, BTU/hr./sq. ft./in./°F, Average	0.15

#07109

Technical Information

SEALED AIR CORPORATION
Old Sherman Turnpike
Danbury Connecticut 06810
(203) 792-2360

P10-4

RECOMMENDATIONS FOR THE USE AND HANDLING OF INSTAPAK® FOAM-IN-PLACE CHEMICALS

P10-5

INTRODUCTION

This technical bulletin provides "Recommendations for the Use and Handling of Instapak® Foam-In-Place Chemicals". Included with the bulletin are OSHA Form-20 Material Safety Data Sheets on the Instapak components and gun solvent.

There are thousands of Instapak installations operating throughout the world, some for nearly ten years. Many tests have been performed to establish the safety of the Instapak system. These tests have been performed by government officials, military agencies, consulting laboratories and industrial companies (users). Many of these detailed test results are available for your inspection or copies can be furnished for your files.

The Instapak foam-in-place system mixes and dispenses two chemicals which react in the presence of a blowing agent, producing urethane foam. In establishing the use and location of this system, we recommend a Seal Air representative be consulted. The Sealed Air representative can be helpful in arranging a work area for maximum safety, including correct use of the system, proper amount and direction of air circulation and proper handling of the chemicals.

This bulletin gives the technical guidance needed for safe operation, proper use and cautions to be observed with the chemicals. The bulletin should be read carefully and operators should be trained and supervised regarding proper handling. Using the technical guidance of this bulletin and the assistance of the Sealed Air representative, the users will find the Instapak foam-in-place system safe and reliable.

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CHEMICAL COMPONENTS

Chemical Component A is known as polymeric isocyanate or crude MDI. Its generic chemical name is polymethylene polyphenyl polyisocyanate. It contains diphenylmethane diisocyanate. As a reactive chemical, hazards can be created through careless or improper handling. The purpose of this publication is to outline proper use and certain precautions, the observance of which will circumvent these hazards.

Chemical Component B is commonly known as a polyol. The typical generic chemical name of polyol is polyoxalkylated glycol. It reacts with isocyanates and is chemically similar to many detergents.

Some Component B formulations contain a chlorofluorocarbon blowing agent. The fluorocarbon is only hazardous at high vapor concentrations which do not occur in normal handling and use. (See Emergency Handling.)

Typical Properties

	<u>Component A</u>	<u>Component B</u>
Physical state at normal temperatures	Oily dark brown liquid	Straw colored liquid
Specific gravity (at 25°C)	1.24	Approx. 1.1*
Boiling point (°C)	Polymerizes about 260°C with evolution of carbon dioxide	Approx. 50*
Flash point (°C)	213	Approx. 200 (See Fire, p.6)
Vapor density (air=1)	8.5	4.8*
Vapor pressure (mm Hg @ 25°C)	Less than .0001	Approx. 50-100*

*Varies somewhat with different systems. See individual data sheets. These properties are for those systems containing chlorofluorocarbon.

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NORMAL OPERATIONS

A "Threshold Limit Value" (TLV) of .02 parts per million (ppm) has been established for diphenylmethane diisocyanate (MDI) by the American Conference of Governmental Industrial Hygienists and this has been included in regulations issued by the Occupational Safety and Health Administration (OSHA). The TLV is a vapor concentration which can be tolerated for 8 hours per day, 40 hours per week. In the case of isocyanates, it is a maximum ceiling value never to be exceeded and is designated TLV (C).

Typically measured concentrations of Instapak Component A, in the operator's breathing zone, are .002 to .005 ppm. These concentrations are four to ten times below the recommended maximums. Air circulation in the operator's breathing zone is as established by normal building code requirements.

The majority of people have no problem with industrial chemicals when the degree of exposure is very low, as in the case of an Instapak System. However, there are those who are asthmatic, or heavy smokers or have dispositions to being sensitive to chemicals. Such individuals should not be assigned as foam-in-place operators. If an operator appears to develop a sensitivity to the chemicals, the operator should be reassigned.

During normal foaming operations, when chemicals are reacted together, only safety glasses (with side shields) or safety goggles are recommended to protect against possible splatter. When the possibility exists of coming into contact with unreacted chemicals (such as changing chemical containers, gun cleaning or replacement, etc.) rubber or plastic gloves should be worn.

ABNORMAL CONDITIONS AND HAZARDS

Abnormal conditions would constitute use of a system in a closed area without any fresh air make-up, fire, spills of chemicals or other exposure to Component A or B in a non-reacted state.

INHALATION EFFECTS

If exposure exceeds .02 parts per million, the vapor of isocyanate (Component A) can irritate the membranes of the nose, throat, lungs and eyes. The symptoms may include watering of the eyes, dryness of the throat, tightness of the chest (sometimes with difficulty in breathing) and headaches. The onset of symptoms may be delayed several hours after exposure.

In liquid form, Component B presents an inhalation hazard only if a heat source causes volatilization of fluorocarbon. In the event of a fire, if large amounts of fluorocarbon are vaporized, the possibility of suffocation exists.

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EFFECTS ON THE EYES

Component A in the liquid form can irritate the eyes causing watering and discomfort; vapor in concentrations significantly higher than the TLV (.02 ppm) causes irritation.

Component B may cause irritation to the eyes.

EFFECT ON THE SKIN

Component A has a mild tanning action on the skin. Occasionally, contact dermatitis is produced as a manifestation of a specific skin allergy.

Component B normally exhibits no harmful effects to the skin. Repeated contact might be irritating.

INGESTION

Component A has low oral toxicity.

Component B has very low oral toxicity.

REACTIVITY

Component A will react with water, sodium hydroxide, ammonia, primary and secondary amines, acids and alcohols. The reactions range from slow to violent resulting in the generation of heat, releasing of carbon dioxide, releasing of isocyanate vapors, and, in closed containers, leading to a build up of pressure.

Component B is stable and presents no reactivity hazard. It may be corrosive to copper-based metals (brass).

EMERGENCY PROTECTIVE EQUIPMENT

COMPONENT A

In the event of a large spill in an area with normal air circulation, an organic vapor mask (canister type) should be used during clean up. Rubber boots and rubber or plastic gloves should also be worn.

Whenever no fresh air make-up is present or there is a fire, or abnormal heat, or if aerosols or mist of Component A are present, the use of full face breathing apparatus with an independent air supply is required.

COMPONENT B

The handling of Component B requires only the use of safety glasses (with side shields) or goggles and rubber or plastic gloves.

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EMERGENCY HANDLING

Component A and B are safe while being stored or transported in containers which have remained closed and intact. A hazard can arise with Component A if the container becomes unsealed resulting in spillage or permitting the entry of water; or, if the container has become pressurized through entry of water or involvement in a fire. During emergency handling, "emergency protective equipment" should be used.

LEAKING CONTAINERS

Leaking containers of Component A or B should be turned where possible so that the damaged part is uppermost and covered to prevent entry of water or dirt. Any spillage should be dealt with as described below in the section on Spills. The contents should be deactivated and disposed as described above in the section on Deactivation and Disposal.

PRESSURIZED CONTAINERS

Any Component A or B container which appears to be in a pressurized state (badly mis-shapened or bulged) should be isolated immediately and covered, e.g. with tarpaulins. The pressure may be relieved either by careful loosening of the bung or, in severe cases, by drilling a small hole in the uppermost part of the container. Whenever possible the hole should be drilled through the bung, since that is the strongest part of the drum. A self tapping screw can be inserted into the hole to prevent further ingress of moisture and to permit relief of further pressure buildup. When depressurizing Component A containers, coveralls, a rubber apron, and rubber boots should be worn in addition to the use of "emergency protective equipment".

SPIILLS

Component A should be absorbed with sweeping compound, Fullers Earth, sawdust or the like and then deactivated by thorough soaking with water containing about 10% concentrated ammonia. After soaking up the spilled liquid, the absorber can then be disposed in regular trash disposal. "Emergency protective equipment" shall be used and all unprotected personnel should be evacuated. As of January, 1981, the Component A isocyanate is not classified by the Environmental Protection Agency in Hazardous Waste Regulations, as a hazardous waste. Furthermore, once waste isocyanate has been deactivated with water the resulting solid plastic material is a safe, insoluble, non-hazardous solid waste that may be disposed of along with other plastic solid waste that may be disposed of along with other plastic wastes, paper, wood, etc.

In those Instapak systems (See the appropriate Material Safety Data Sheets (MSDS)) where the Component B contains a chlorofluorocarbon (CFC) blowing agent, the CFC in the waste Component B is classified by EPA as a "Toxic Waste" (T) and must be disposed of in accordance with regulations. Such waste should be given only to a qualified, approved, licensed waste disposal firm. For handling, spilled material should be absorbed on Fuller's Earth, sawdust or sweeping compound.

Waste Component B can, of course, be converted into a non-hazardous solid waste by treatment with excess Component A, followed by treatment

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of that mixture with ammonia water.

The Component B of those systems (see the MSDS) which do not contain CFC are not "hazardous waste".

FIRE

Component A has a high flash point and is combustible but not flammable. However, it may burn if heated sufficiently. Should it burn, fumes in highly toxic concentrations will be evolved, therefore, the building should be evacuated. The use of full "emergency protective equipment", including self-contained breathing apparatus, is essential. Containers involved in the fire, but not themselves on fire, should be sprayed with water to minimize risk of rupture. Suitable extinguishing agents include dry chemical powder, carbon dioxide, foam, or water. If water is used, it should be in a very large quantity, and care must be exercised as the reaction between water and hot isocyanate can be vigorous.

Component B contains both water and, in some systems, fluorocarbon blowing agents, both of which are not flammable. The fluorocarbon will decompose in a fire emitting highly toxic fumes. The residual is a combustible liquid with a very high flash point.

DEACTIVATION AND DISPOSAL

COMPONENT A

In disposal, large quantities of Component A should be divided into quantities not exceeding 10 pounds and deactivated with water containing about 10% concentrated ammonia solution. An alternate procedure is to use a solution of one part of Component B plus ten parts water.

Containers of Component A that are not completely empty are most safely disposed of by adding several gallons of this ammonia water to the container and allowing the open container to stand for 48 hours. The liquid is poured into the sanitary sewer and the solids formed are transferred to trash disposal or disposed of along with the container. If water without ammonia or Component B is used, the containers should be allowed to stand for four to five days before disposal.

A fire hazard from spontaneous combustion exists if large quantities (in excess of ten pounds) of Component A are disposed without deactivation directly into trash containers due to the heat evolved from any chemical reaction that might occur from contact with other materials in the trash container.

COMPONENT B

The Component B of systems that do not contain fluorocarbons (CFC) (see above) are similar to industrial cleaning compound and small waste quantities can be disposed with similar liquid wastes. Residuals in empty containers can be washed into the sanitary sewer with water. Larger quantities can be absorbed on sweeping compound and disposed with solid trash.

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For systems containing CFC, they must either be converted to non-hazardous solid waste (see discussion under spills) or handled in accordance with regulations.

MEDICAL ACTION

COMPONENT A

Skin Contamination -

Wash with soap and water for at least five minutes.

Splashing in Eyes -

Wash with large amounts of water for at least 15 minutes and consult an eye physician.

Inhalation -

Remove from risk of further exposure, administer oxygen, if necessary, and obtain medical attention.

Ingestion -

Obtain medical attention.

Note for Guidance of Physicians -

In cases of serious injury to persons after exposure to isocyanates, treatment is essentially symptomatic.

COMPONENT B

Skin and Eyes -

Flush with water. Wash with large amounts of water for at least 15 minutes and consult an eye physician.

Inhalation:

For excessive exposure, remove to fresh air, administer oxygen, if necessary, consult a physician.

Ingestion -

Practically non-toxic by ingestion.

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ATMOSPHERIC MONITORING

Equipment capable of accurate measurement of isocyanate vapors at these low levels is available from MDA Scientific, Inc., 808 Busse Highway, Park Ridge, Illinois 60068. NIOSH method P&CAM No. 142 may also be used.

ORGANIC VAPORS MASK

A satisfactory organic vapors mask is Willson Respirator #1221, ESB, Inc., Reading, Pennsylvania 19603, 215/376-6161. This is not a self-contained breathing apparatus, which is required for fire (or spills in the absence of ventilation) in which Component A is involved.

EYE WASH

A satisfactory portable, pressurized eye wash is ENCON Model 1010-10, Encon, 4914 Dickson, Houston, Texas 77001, 713/869-9558.

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Sealed Air Corporation

3441 ARDEN ROAD / HAYWARD, CALIFORNIA 94545 / TELEPHONE (415) 887-8090

Models 750 and 760 Instructions

INSTALLATION

Preparation should be made for the following to be ready for day of installation.

1. Electrical:

30 Amp, 125 Volt dedicated circuit equipped with 30A, 125 volt, three wire, 2 pole twist-lock receptacle-NEMA reference-L5-30R Hubbell Catalog No. 2610. Receptacle should be within 8' of planned console location. Circuit requires minimum of 10 AWG wire to ensure safety and efficient operation.

2. Pressure:

Shop Air-3 cubic feet per minute at 100 psi. Any drops below 100 psi. will cause mix, ration and foam quality deterioration. Pressure source to be within 8' of console location.

4. Console:

Should be wall mounted or on a bracket or bench maintaining similar orientation, convenient and visible to operator's position, while packing.

5. Hoses:

Will be hung, preferably from above, with balancer and hanger supplied by Instapak.. Balance should be located above gun holster.

6. Holster:

Should be located at most convenient position for the operator

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Models 750 and 760 Instructions
Page -2-

to remove and replace gun during packaging.

7. Location:

Preferably at end of Production Line or conveniently placed
in packaging area or Shipping Department.

8. Questions:

Contact account representative or sales representative at
(415) 887-8090.

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INSTAPAK <small>U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration</small>	U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration	<small>Form Approved OMB No. 44-10130</small>
<h2 style="margin: 0;">MATERIAL SAFETY DATA SHEET</h2>		
<small>Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)</small>		

SECTION I	
MANUFACTURER'S NAME Instapak Division, Sealed Air Corporation <small>Address (Number, Street, City, State, and ZIP Code)</small> Old Sherman Turnpike, Danbury, CT 06810	EMERGENCY TELEPHONE NO. 203-792-2360
CHEMICAL NAME AND SYNONYMS Diphenyl Methane Diisocyanate Polymeric Isocyanate	TRADE NAME AND SYNONYMS Instapak - 100F Component A FORMULA R-(NCO)x

SECTION II - HAZARDOUS INGREDIENTS					
PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
Diphenyl Methane Diisocyanate				40	0.02 ppm
Higher polymers of similar structure				40	not est.
Trichlorofluoromethane				14	100 ppm

SECTION III - PHYSICAL DATA			
BOILING POINT (°F)	~100°F	SPECIFIC GRAVITY (H ₂ O=1)	1.28
VAPOR PRESSURE (mm Hg)	25°C 400	PERCENT VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)	Heavier	EVAPORATION RATE (_____ %)	
SOLUBILITY IN WATER	Insoluble		
APPEARANCE AND ODOR Brown viscous liquid, sweet halocarbon odor			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA			
FLASH POINT (Method used)	385°F C.O.C.	FLAMMABLE LIMITS	non-flammable
		Lel	Uel
EXTINGUISHING MEDIA CO ₂ , dry chemical, chemical foam			
SPECIAL FIRE FIGHTING PROCEDURES Provide usual fireman's protective clothing plus self-contained breathing			
Advise us to protect from product vapors.			
UNUSUAL FIRE AND EXPLOSION HAZARDS Pressure will develop with heat in closed container.			

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SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

02 ppm for Diphenylmethane Diisocyanate 1000 ppm for Fluorotrichloromethane

EFFECTS OF OVEREXPOSURE

Irritation of mucous membrane, tightness of chest, irritation of respiratory tract, coughing, headache and shortness of breath. Repeated over exposure can lead to allergic sensitivity.

EMERGENCY AND FIRST AID PROCEDURES

Skin - wash with soap & water for at least 5 min. Eyes - wash with large amounts of water for at least 15 min., consult eye physician. Internal - induce vomiting consult physician. Inhalation - remove to uncontaminated area; administer oxygen, if necessary, consult physician.

SECTION VI - REACTIVITY DATA

STABILITY

UNSTABLE

STABLE

CONDITIONS TO AVOID

Avoid temperature below 32°F (causes crystallization)

or above 120°F (causes slow increase in viscosity)

INCOMPATIBILITY (Materials to avoid): Avoid contact with water, alcohols, strong bases, metal compounds, surface active agent.

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION

MAY OCCUR

WILL NOT OCCUR

CONDITIONS TO AVOID

Avoid contact with moisture or other

materials that react with isocyanates.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Absorb in sawdust or sweeping compound; remove from area in open drums and wet with water containing about 1% ammonia before disposal. Note that EPA regulations classify the fluorocarbon component as a "hazardous waste".

WASTE DISPOSAL METHOD

The solidified isocyanate portion (after wetting) can be disposed of in solid trash

IF there is any residual fluorocarbon, it must be disposed of in accordance with

EPA and local hazardous waste disposal regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

VENTILATION

LOCAL EXHAUST To maintain vapor concentration below TLV
MECHANICAL (General)

SPECIAL

OTHER

PROTECTIVE GLOVES

Chemically resistant

EYE PROTECTION

Safety goggles

OTHER PROTECTIVE EQUIPMENT

Safety showers and eye wash stations should be available.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Protect from humid air. Store between 20-110°F. Use between 60-90°F.

OTHER PRECAUTIONS

Shake containers carefully, if over 80°F contents may be under slight pressure.

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SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

None established

EFFECTS OF OVEREXPOSURE

May be irritating to eyes, mucous membranes and upon repeated or prolonged contact with skin.

EMERGENCY AND FIRST AID PROCEDURES

Classified as practically non-toxic by ingestion. Eyes - flush thoroughly with large quantities of water. Skin - wash with soap & water. Inhalation - for exposure; remove to fresh air, administer oxygen if necessary, consult a physician.

SECTION VI - REACTIVITY DATA

STABILITY

UNSTABLE

CONDITIONS TO AVOID

STABLE

X

INCOMPATIBILITY (Materials to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS
POLYMERIZATION

MAY OCCUR

CONDITIONS TO AVOID

WILL NOT OCCUR

X

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Wash away with water or absorb on sweeping compound.

WASTE DISPOSAL METHOD

Bury or incinerate in accordance with environmental considerations, Federal, State and local regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

VENTILATION

LOCAL EXHAUST

SPECIAL

MECHANICAL (General)

OTHER

PROTECTIVE GLOVES

Chemically resistant

EYE PROTECTION

Safety goggles

OTHER PROTECTIVE EQUIPMENT

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Store between 20 and 110°F

Use between 60 and 90°F

OTHER PRECAUTIONS

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<p>INSTAPAK <small>SEALING AND CONTAINMENT</small> <small>U.S. DEPARTMENT OF LABOR</small></p>	<p>U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration</p>	<p><small>Form Approved</small> <small>OMB No. 44-11367</small></p>
<h1 style="margin: 0;">MATERIAL SAFETY DATA SHEET</h1>		
<p><small>Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)</small></p>		

SECTION I	
<p>MANUFACTURER'S NAME Instapak Division, Sealed Air Corporation</p>	<p>EMERGENCY TELEPHONE NO. 203-792-2360</p>
<p>ADDRESS (Number, Street, City, State, and ZIP Code) Old Sherman Turnpike, Danbury, CT 06810</p>	
<p>CHEMICAL NAME AND SYNONYMS Urethane Resin</p>	<p>TRADE NAME AND SYNONYMS Instapak 200 Component B</p>
<p>CHEMICAL FAMILY</p>	<p>FORMULA</p>

SECTION II - HAZARDOUS INGREDIENTS					
PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
Trichlorofluoromethane				20	1000ppm

SECTION III - PHYSICAL DATA				
BOILING POINT (°F.)	Approx.	100°F	SPECIFIC GRAVITY (H ₂ O=1)	1.14
VAPOR PRESSURE (mm Hg.)	@ 100°F	900	PERCENT. VOLATILE BY VOLUME (%)	15
VAPOR DENSITY (AIR=1)		Heavier	EVAPORATION RATE (_____=1)	
SOLUBILITY IN WATER		Miscible		
APPEARANCE AND ODOR				
Straw colored, viscous liquid, fluorocarbon odor.				

SECTION IV - FIRE AND EXPLOSION HAZARD DATA							
FLASH POINT (Method used)	Not flammable.	FLAMMABLE LIMITS	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Lel</td> <td style="width: 50%;">Uel</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>	Lel	Uel		
Lel	Uel						
EXTINGUISHING MEDIA							
SPECIAL FIRE FIGHTING PROCEDURES							
Water may be used.							
UNUSUAL FIRE AND EXPLOSION HAZARDS							
Pressure will develop with heat.							

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SECTION V - HEALTH HAZARD DATA	
THRESHOLD LIMIT VALUE	
For fluorocarbon component, 1000 ppm (See Fluorotrichloromethane)	
EFFECTS OF OVEREXPOSURE	
Contact with eyes may be irritating. Repeated contact with skin may be irritating.	
High concentrations of vapors may cause narcosis, anesthesia or suffocation.	
EMERGENCY AND FIRST AID PROCEDURES	
Classified as practically non-toxic by ingestion. Eyes - flush thoroughly with large quantities of water. Skin - wash with soap & water. Inhalation - for excessive exposure; remove to fresh air, administer oxygen if necessary, consult physician.	

SECTION VI - REACTIVITY DATA			
STABILITY	UNSTABLE		CONDITIONS TO AVOID Avoid temperatures below 20°F, (causes crystallization) and above 80 F. containers
	STABLE	X	will be under pressure. Heating causes pressure in containers.
INCOMPATIBILITY (Materials to avoid)			
HAZARDOUS DECOMPOSITION PRODUCTS			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES	
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED	
Wash away with water or absorb on sweeping compound or other absorbant material.	
Provide sufficient ventilation to keep fluorocarbon vapor concentration below TLV of 1000 ppm.	
WASTE DISPOSAL METHOD	
Bury or incinerate in accordance with environmental considerations and control regulations.	

SECTION VIII - SPECIAL PROTECTION INFORMATION		
RESPIRATORY PROTECTION (Specify type)		
If vapor concentrations are extreme, provide organic vapors gas mask or outside air		
VENTILATION	LOCAL EXHAUST	SPECIAL source, or self-contained
	MECHANICAL (General)	OTHER breathing apparatus.
PROTECTIVE GLOVES	Chemically resistant	EYE PROTECTION Safety goggles
OTHER PROTECTIVE EQUIPMENT		

SECTION IX - SPECIAL PRECAUTIONS	
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING	
Store in cool area. Maximum storage temperature range 20-100°F. Containers above about 80°F will be under pressure and must be opened with care.	
OTHER PRECAUTIONS	

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U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-11387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME

Instapak Division, Sealed Air Corporation

EMERGENCY TELEPHONE NO.

203-792-2360

ADDRESS (Number, Street, City, State, and ZIP Code)

Old Sherman Turnpike, Danbury, CT 06810

CHEMICAL NAME AND SYNONYMS

Urethane Resin

TRADE NAME AND SYNONYMS

Instapak 75 Component B

CHEMICAL FAMILY

FORMULA

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
Trichlorofluoromethane				13	1000ppm

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	Approx.	100°F	SPECIFIC GRAVITY (H ₂ O=1)	1.09
VAPOR PRESSURE (mm Hg)	@ 100°F	900	PERCENT VOLATILE BY VOLUME (%)	15
VAPOR DENSITY (AIR=1)		Heavier	EVAPORATION RATE (—=1)	
SOLUBILITY IN WATER		Miscible		
APPEARANCE AND ODOR	Straw colored, viscous liquid, fluorocarbon odor.			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	Not flammable	FLAMMABLE LIMITS	LeI	UeI
EXTINGUISHING MEDIA				
SPECIAL FIRE FIGHTING PROCEDURES	Water may be used.			
UNUSUAL FIRE AND EXPLOSION HAZARDS	Pressure will develop with heat.			

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SECTION V - HEALTH HAZARD DATA	
THRESHOLD LIMIT VALUE <u>No limit</u>	
EFFECTS OF OVEREXPOSURE <u>Contact with eyes may be irritating. Repeated contact with skin may be irritating.</u>	
EMERGENCY AND FIRST AID PROCEDURES <u>Classified as practically non-toxic by ingestion. Eyes - flush thoroughly with water. Skin - wash with soap & water. Inhalation - vapors may be irritating if material is hot.</u>	

SECTION VI - REACTIVITY DATA			
STABILITY	UNSTABLE		CONDITIONS TO AVOID <u>Avoid temperatures below 20°F (freezes)</u>
	STABLE	X	
INCOMPATIBILITY (Materials to avoid)			
HAZARDOUS DECOMPOSITION PRODUCTS			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES	
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED <u>Wash away with water or absorb on sweeping compound or other absorbant material.</u>	
WASTE DISPOSAL METHOD <u>Bury incinerate in accordance with environmental considerations and control regulations.</u>	

SECTION VIII - SPECIAL PROTECTION INFORMATION		
RESPIRATORY PROTECTION (Specify type)		
VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL (General)	OTHER
PROTECTIVE GLOVES <u>Chemically resistant</u>		EYE PROTECTION <u>Safety goggles</u>
OTHER PROTECTIVE EQUIPMENT		

SECTION IX - SPECIAL PRECAUTIONS	
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING <u>Keep from freezing (above 20°F.)</u>	
OTHER PRECAUTIONS	

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INSTAPAK <small>Sealed Air Corporation</small>	U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration	<small>Form Approved OMB No. 44-11387</small>
	<h1>MATERIAL SAFETY DATA SHEET</h1>	
<p align="center">Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)</p>		

SECTION I	
MANUFACTURER'S NAME Instapak Division, Sealed Air Corporation	EMERGENCY TELEPHONE NO. 203-792-2360
ADDRESS (Number, Street, City, State, and ZIP Code) Old Sherman Turnpike Danbury, CT 06810	
CHEMICAL NAME AND SYNONYMS Diphenylmethane Diisocyanate	TRADE NAME AND SYNONYMS Instapak Component RA-A
CHEMICAL FAMILY Polymeric Isocyanate	FORMULA

SECTION II - HAZARDOUS INGREDIENTS					
PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
Diphenylmethane Diisocyanate				Approx.	40 .02ppm
Higher polymers of similar structure				Approx.	40 not est.
Fluorotrichloromethane					5 1000ppm

SECTION III - PHYSICAL DATA				
BOILING POINT (°F.)	Approx.	150	SPECIFIC GRAVITY (H ₂ O=1)	1.26
VAPOR PRESSURE (mm Hg.)	at 25°C	ca. 100	PERCENT VOLATILE BY VOLUME (%)	5
VAPOR DENSITY (AIR=1)		4.8	EVAPORATION RATE (_____ °1)	
SOLUBILITY IN WATER		insol.		
APPEARANCE AND ODOR Brown liquid, slightly aromatic odor.				

SECTION IV - FIRE AND EXPLOSION HAZARD DATA							
FLASH POINT (Method used)	385°F C.O.C.	FLAMMABLE LIMITS not flammable	<table border="1"> <tr> <td>Let</td> <td>Uet</td> </tr> <tr> <td></td> <td></td> </tr> </table>	Let	Uet		
Let	Uet						
EXTINGUISHING MEDIA CO ₂ , dry chemical, chemical foam							
SPECIAL FIRE FIGHTING PROCEDURES Provide usual fireman's protective clothing plus self-contained breathing apparatus to protect from product vapors.							
UNUSUAL FIRE AND EXPLOSION HAZARDS Pressure will develop with heat in closed containers.							

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SECTION V - HEALTH HAZARD DATA	
THRESHOLD LIMIT VALUE 0.02 ppm for Diphenylmethane Diisocyanate, 1000 ppm for Fluorotrichloromethane.	
EFFECTS OF OVEREXPOSURE Irritation of mucous membranes, tightness of chest, irritation of respiratory tract, coughing, shortness of breath, headache. Repeated overexposure can lead to allergic sensitivity.	
EMERGENCY AND FIRST AID PROCEDURES Skin - wash with soap & water for at least 5 minutes. Eyes - wash with large amounts of water for at least 15 minutes, consult eye physician. Internal - induce vomiting, consult physician. Inhalation - remove to uncontaminated area; administer oxygen if necessary, consult physician.	

SECTION VI - REACTIVITY DATA			
STABILITY	UNSTABLE		CONDITIONS TO AVOID Avoid temperatures below 10°F (causes crystallization) or above 120°F (causes slow increase in viscosity). Containers above 100°F will be under pressure.
	STABLE	X	
INCOMPATIBILITY (Materials to avoid) Avoid contact with water, alcohols, strong bases, metal compounds, surface active agents.			
HAZARDOUS DECOMPOSITION PRODUCTS			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID Avoid contact with moisture or other materials that react with isocyanate.
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES	
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Absorb in sawdust or sweeping compound; remove from area in open Drums and wet with water containing about 1% ammonia before disposal. Note that EPA regulations classify the fluorocarbon component as a "hazardous waste"	
WASTE DISPOSAL METHOD The solidified isocyanate portion (after wetting) can be disposed of in solid trash. If there is any residual fluorocarbon, it must be disposed of in accordance with EPA and local hazardous waste disposal regulations.	

SECTION VIII - SPECIAL PROTECTION INFORMATION			
RESPIRATORY PROTECTION (Specify type) Canister type gas masks for organic vapors, masks supplied from external air source or self-contained breathing apparatus.			
VENTILATION	LOCAL EXHAUST	To maintain vapor concentration below TLV	SPECIAL
	MECHANICAL (General)		OTHER
PROTECTIVE GLOVES Chemically resistant		EYE PROTECTION Safety goggles.	
OTHER PROTECTIVE EQUIPMENT Safety showers and eye wash stations should be available.			

SECTION IX - SPECIAL PRECAUTIONS	
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Protect from humid air. Store between 10-120°F. Use between 60-90°F.	
OTHER PRECAUTIONS Use containers carefully - if over 100°F contents will be under pressure.

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-11387

MATERIAL SAFETY DATA SHEET

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Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME Instapak Division, Sealed Air Corporation		EMERGENCY TELEPHONE NO. 203-792-2360
ADDRESS, Number, Street, City, State, and ZIP Code Old Sherman Turnpike, Danbury, CT 06810		
CHEMICAL NAME AND SYNONYMS Diethylene Glycol Mono-ethyl Ether: Ethanol, 2-(2-ethoxy ethoxy)-		TRADE NAME AND SYNONYMS Instapak Gum Solvent
CHEMICAL FAMILY Glycol Ethers	FORMULA <chem>C2H5OC2H4OC2H4OH</chem>	

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
Not classified hazardous.					

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	397	SPECIFIC GRAVITY (H ₂ O=1)	0.989
VAPOR PRESSURE (mm Hg.)	<0.1	PERCENT VOLATILE BY VOLUME (%)	N11
VAPOR DENSITY (AIR=1)	4.6	EVAPORATION RATE (_____ = 1)	<1
SOLUBILITY IN WATER	Complete		
APPEARANCE AND ODOR Colorless liquid; mild and characteristic odor			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): Tag open cup 205°F.	FLAMMABLE LIMITS	LEL	UEL
		1.2	8.5 (vol)
EXTINGUISHING MEDIA Carbon dioxide or dry chemical for small fires.			
SPECIAL FIRE FIGHTING PROCEDURES Use alcohol-type foam for large fires.			
UNUSUAL FIRE AND EXPLOSION HAZARDS None			

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SECTION V - HEALTH HAZARD DATA	
THRESHOLD LIMIT VALUE For fluorocarbon component, 1000 ppm (See Fluorotrichloromethane)	
EFFECTS OF OVEREXPOSURE Contact with eyes may be irritating. Repeated contact with skin may be irritating. High concentrations of vapors may cause narcosis, anesthesia or suffocation.	
EMERGENCY AND FIRST AID PROCEDURES Classified as practically non-toxic by ingestion. Eyes - flush thoroughly with large quantities of water. Skin - wash with soap & water. Inhalation - for excessive exposure; remove to fresh air, administer oxygen if necessary, consult a physician.	

SECTION VI - REACTIVITY DATA			
STABILITY	UNSTABLE		CONDITIONS TO AVOID Avoid temperatures below 200°F. (causes crystallization) and above 800°F. containers
	STABLE	X	will be under pressure. Heating causes pressure in containers.
INCOMPATIBILITY (Materials to avoid)			
HAZARDOUS DECOMPOSITION PRODUCTS			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES	
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Wash away with water or absorb on sweeping compound or other absorbant material. Provide sufficient ventilation to keep fluorocarbon vapor concentration below TLV of 1000 ppm.	
WASTE DISPOSAL METHOD Bury or incinerate in accordance with environmental considerations and control regulations.	

SECTION VIII - SPECIAL PROTECTION INFORMATION		
RESPIRATORY PROTECTION (Specify type) If vapor concentrations are extreme, provide organic vapors gas mask or outside air		
VENTILATION	LOCAL EXHAUST	SPECIAL source, or self-contained
	MECHANICAL (General)	OTHER breathing apparatus.
PROTECTIVE GLOVES	Chemically resistant	EYE PROTECTION Safety goggles
OTHER PROTECTIVE EQUIPMENT		

SECTION IX - SPECIAL PRECAUTIONS	
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Store in cool area. Maximum storage temperature range 20-100°F. Containers above about 80°F will be under pressure and must be opened with care.

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET P10-30

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME Instapak Division, Sealed Air Corporation		EMERGENCY TELEPHONE NO. 203-792-2360
ADDRESS (Number, Street, City, State, and ZIP Code) Old Sherman Turnpike, Danbury, CT 06810		
CHEMICAL NAME AND SYNONYMS Urethane Resin		TRADE NAME AND SYNONYMS Instapak 40 Component B
CHEMICAL FAMILY		FORMULA

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Trichlorofluoromethane	15	1000ppm

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	Approx. 100°F.	SPECIFIC GRAVITY (H ₂ O=1)	1.09
VAPOR PRESSURE (mm Hg.)	@ 100°F. 900	PERCENT. VOLATILE BY VOLUME (%)	15
VAPOR DENSITY (AIR=1)	Heavier	EVAPORATION RATE (_____ = 1)	
SOLUBILITY IN WATER	Miscible		
APPEARANCE AND ODOR	Straw colored, viscous liquid, fluorocarbon odor.		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used)	Not flammable	FLAMMABLE LIMITS	Low	High
EXTINGUISHING MEDIA				
SPECIAL FIRE FIGHTING PROCEDURES	Water may be used.			
UNUSUAL FIRE AND EXPLOSION HAZARDS	Pressure will develop with heat.			

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SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

None established

EFFECTS OF OVEREXPOSURE

No harmful effects are expected from breathing vapors or from contact with skin or eyes.

EMERGENCY AND FIRST AID PROCEDURES

Flush skin and eye contact with water.

SECTION VI - REACTIVITY DATA

STABILITY

UNSTABLE

CONDITIONS TO AVOID

STABLE

X

None

INCOMPATIBILITY (Materials to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS
POLYMERIZATION

MAY OCCUR

WILL NOT OCCUR

X

CONDITIONS TO AVOID

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Flush with large amount of water.

WASTE DISPOSAL METHOD

Atomize into an incinerator. Combustion may be improved by mixing with a more flammable solvent.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

VENTILATION

LOCAL EXHAUST

Not required

SPECIAL

MECHANICAL (General)

OTHER

PROTECTIVE GLOVES

EYE PROTECTION

Goggles

OTHER PROTECTIVE EQUIPMENT

Laboratory coat, eye bath, safety shower.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form OSHA
308 No. 1

MATERIAL SAFETY DATA SHEET P10-32

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME

Instapak Division, Sealed Air Corporation

EMERGENCY TELEPHONE NO.

203-792-2360

ADDRESS, Mailing, Street, City, State, and ZIP Code

Old Sherman Turnpike, Danbury, CT 06810

CHEMICAL NAME AND SYNONYMS

Diphenylmethane Diisocyanate

TRADE NAME AND SYNONYMS

Instapak Component A

CHEMICAL FAMILY

Isocyanate Compounds

FORMULA

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Unit)	ALLOYS AND METALLIC COATINGS	%
PIGMENTS			BASE METAL	
CATALYST			ALLOYS	
VEHICLE			METALLIC COATINGS	
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX	
ADDITIVES			OTHERS	
OTHERS				
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%
Diphenylmethane diisocyanate			Approx.	50%
Higher polymers of similar structure			Approx.	50%
				50%

SECTION III - PHYSICAL DATA

BOILING POINT (°F.) at 5 mm Hg	208°C	SPECIFIC GRAVITY (H ₂ O=1)	1.
VAPOR PRESSURE (mm Hg) at 25°C.	<.0001	PERCENT VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (H ₂ O=1)	
SOLUBILITY IN WATER	Insol.		
APPEARANCE AND ODOR Brown viscous liquid, slightly aromatic odor			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Methods used)	213°C. (C.O.C.)	FLAMMABLE LIMITS	Fire Point 232°C.
EXTINGUISHING MEDIA CO ₂ , dry chemical, chemical foam or water fog			
SPECIAL FIRE FIGHTING PROCEDURES Provide usual fireman's protective clothing plus self-contained breathing apparatus to protect from product vapors.			
ADDITIONAL FIRE AND EXPLOSION HAZARDS			

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SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
 0.25% for Diphenylmethane diisocyanate
 Irritation of mucous membrane, dryness of throat, irritation of respiratory tract, coughing, headache and shortness of breath. Repeated over-exposure can lead to bronchial asthma.
 EMERGENCY AND FIRST AID PROCEDURES
 Skin - Wash with soap & water for at least 4 min. Eyes - Wash with large amounts of water for at least 15 min., consult eye physician. Internal - Consult physician. Inhalation - Remove to uncontaminated area; administer oxygen, if necessary, consult physician.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE	CONDITIONS TO AVOID
	STABLE	Avoid temperature below 32°F. (causes crystallization)
		X or above 120°F. (causes slow increase in viscosity)

INCOMPATIBILITY: Materials to avoid:
 Avoid contact with water, alcohols, strong bases, metal compounds, surface active agents.
 HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	MAY OCCUR	CONDITIONS TO AVOID
	WILL NOT OCCUR	Avoid contact with moisture or other materials that react with isocyanates.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
 Absorb in sand or sweep into compound; remove from area in open drums and wet with water containing about 1% ammonia before disposal.

WASTE DISPOSAL METHOD
 In accordance with environmental considerations and current regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Specify type: Canister-type gas masks for organic vapors, masks supplied from external air source or self-contained breathing apparatus.

VENTILATION: LOCAL EXHAUST To maintain vapor concentration below 0.25%
 MECHANICAL (General) OTHER

PROTECTIVE GLOVES: Chemically resistant EYE PROTECTION: Safety goggles

OTHER PROTECTIVE EQUIPMENT
 Safety showers and eye wash stations should be available.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
 This isocyanate should be protected from humid air and should be stored at 20-110°F. Before using, containers should be brought within the range of 60-90°F.

Technical Data Sheet

INSTAPAK®

SEALED AIR CORPORATION
Old Sherrin Turnpike
Danbury, Connecticut 06810
(203) 792-2300

P10-34

COMBUSTIBILITY OF INSTAPAK® FOAM IN CARTONS

Attached is a copy of a report of a burn test performed by Factory Mutual Research on product packaged in INSTAPAK® foam. The report is rather brief and, in its original form, was incomplete in data.

The Factory Mutual report compared Instapak foam packaging with "paper products" without giving a detailed description of the fire progress in the case of the paper. Furthermore, a separate test was performed in which the product packaged in foam polystyrene was burned. The burning temperature data from that test are added to the data in Appendices A and B.

Useful interpretations can be drawn from this test by studying the burn temperature curves and taking into account the combustibility properties of the materials involved. There are some basic differences in the properties of paper (or wood), INSTAPAK foam and other plastic packaging foams which lead to quite different degrees of fire involvement hazard in spite of such conclusions as "burns more severely than paper" or the fact that polystyrene foam packaging can cause a disastrous, run-away fire.

These differences bring into appreciation that the temperatures involved in a fire include the product of both the density and heat of combustion of the material. The combination of these properties determines the total amount of heat energy that will develop in a fire.

One must take into account the total weight of material that will burn in a stack of product plus how many BTU's per pound this material will be generated as heat. The case of INSTAPAK foam is relatively favorable when one considers its very low density (less than 1/2 pound per cubic foot; most plastic foams are 3 to 7 times this dense) and the fact that its heat of combustion (of about 10,000 BTU's per pound) is about the same magnitude as that of wood and paper products. Plastic foams of the hydrocarbon type (polyethylene foam or polystyrene foam) have heats of combustion that are about 50-80% higher than this.

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When a pile of goods packaged with polyethylene or polystyrene foam burns, it will generate a tremendous amount of heat (energy) from the combination of its greater weight (density) and heat of combustion. This is the reason for the extreme fire and temperatures that occurred when a burn test of polystyrene foam packaged goods data were added to the temperature curves from the INSTAPAK foam burn test.

In the comparison of the paper and INSTAPAK foam burned under a sprinkler system, the temperature histories were much the same. The quick rise in temperature released the sprinkler heads which succeeded in both cases, in extinguishing the fire without extreme temperatures ever being reached.

The case of the free burn test is particularly interesting. In a completely free burn, it is notable that the maximum temperature generated by the INSTAPAK foam pile was higher than that from the paper, though not as extreme as the polystyrene foam. The reason for this is that, again due to its very low density, the INSTAPAK foam is consumed very quickly and all of the heat to be generated is given off and, with no more readily combustible fuel present, the temperature drops quickly to well below the kindling temperature of surrounding materials. This is a very important advantageous character that should be appreciated as significant.

Whereas the INSTAPAK, as compared with paper, gave a very short "burst" of heat energy, it quickly died out. With paper and its correspondingly greater total weight high temperatures (for example about 900°F after 6 minutes) persisted for a long time.

While the attached report may be considered by insurance groups as insufficient to classify INSTAPAK foam, it is obvious from the temperature data that it does not present the same serious fire hazard as a plastic foam like polystyrene, which is lumped into the broad "Class IV commodity". In some ways the INSTAPAK foam actually has some advantage over paper packaging materials. The very least that the temperature curves show is that a sprinkler system of moderately low density had the same effect on controlling the INSTAPAK foam fire and the paper products fire.

The other aspect of combustibility that arises is the question of whether INSTAPAK foam will readily ignite on exposure to the kind of temperatures present in a warehouse fire. The foam will certainly burn rapidly if a piece is ignited with a match, for example, but such a crude demonstration does not resolve the question of how readily a package might ignite. In order to quantify this question, INSTAPAK had additional tests performed by York Research Corporation and a copy of their report is also attached hereto.

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This York report is further evidence that INSTAPAK foam is no more hazardous (probably less so) than a heavy paper such as corrugated box board. The latter actually ignites rather readily when exposed to radiant heat while the INSTAPAK foam only distorted without igniting.

One cannot help but conclude that all of these test experiences put together are rather strong evidence that INSTAPAK foam is a relatively safe packaging material.

Dr. Robert C. Ferris
Director of Chemical Operations

P10-37

**SMALL SIZE COMBUSTIBILITY TESTS
OF
"INSTAPAK" PACKAGING MATERIAL
IN CARTONS
USED BY
IBM CORPORATION**

Report By:

W. P. Thomas-Mar. 2, 1973

Factory Mutual Research

1151 Boston-Providence Turnpike
Norwood, Massachusetts 02062

Factory Mutual Research

1151 Boston-Providence Turnpike
Norwood, Massachusetts 02062

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**SMALL SIZE COMBUSTIBILITY TESTS
OF
"INSTAPAK" PACKAGING MATERIAL
IN CARTONS
USED BY
IBM CORPORATION**

I ABSTRACT

IBM Corporation uses a type of foamed urethane packaging material ("Instapak") when placing their manufactured commodity in cardboard cartons. "Instapak" is in use at one location and being considered for use at a number of other IBM locations. It was proposed to test these commodities in the small size combustibility test series to help determine its relative combustibility. Two tests were conducted - one with sprinkler protection and one free burn. This report will give the results of the title tests and then compare the results with some of the other commodities tested in the same configuration.

II TEST ARRANGEMENT

Each test was conducted in a 2 pallet load x 2 pallet load x 2 pallet load high rack arrangement (Appendix A) in the 30 ft high section of the FM Research Center in W. Gloucester, R. I. Each test used two cartons per pallet load. Each carton size was 2 ft x 2 ft x 3 ft and was about 3/4 filled with "Instapak", and had some scrap material (noncombustible) within the "Instapak". Each carton with the "Instapak" weighed about 15 lbs.

III FIRE EVENTS AND RESULTS

A. Test 1

This test had 2 cartons per pallet load. The rack arrangement was protected by 160°F rated, 1/2 in. orifice sprinklers. Ceiling sprinkler spacing was 10 ft x 10 ft and automatic pressure controls supplied 30 gpm to each operating sprinkler, providing a density of 0.30 gpm/ft².

The pile was ignited by four rolls of cellulose cotton each soaked in 1/4 pint of gasoline at the base and middle of the lower level pallet loads (Appendix A).

1. Fire Events

A detailed log of fire events follows:

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--2--

<u>Time</u> <u>Min:Sec</u>	<u>Observations</u>
0:00	Ignition
0:05	Flames to top of first tier
0:30	Flames to top of second tier
1:10	Flames to outer edges of top tier and intermittent on the ceiling
1:22	First 2 sprinklers operated
1:25	Third sprinkler operated
1:30	Fourth sprinkler operated
2:05	Top tier completely engulfed in flame
2:25	Fifth and last sprinkler operated
3:30	Top tier pallet mostly consumed
4:15	Very little flame remains - almost all consumed
6:00	Test Stopped with hose on residual flame

2. Results

Ceiling temperatures reached a peak of about 700°F at 3 min 30 sec from ignition. Five sprinklers operated. (See Appendix B)

B. Test 2

The cartons per pallet load, the arrangement, and the ignition source were the same as Test 1. However, this was a free burn test with no sprinkler protection.

1. Fire Events

A detailed log of fire events follows:

<u>Time</u> <u>Min:Sec</u>	<u>Observations</u>
0:00	Ignition
0:06	Flames to top of first tier
0:30	Flames to top of second tier
1:07	Flames to outer faces of top tier
1:25	Flames intermittent on the ceiling
2:00	Flames engulf top tier
2:37	A top tier box fell off
4:15	Very few combustibles remain
6:00	Test stopped with hose on residual flame

2. Results

Ceiling temperatures reached a peak of 1375°F after 2 minutes from ignition. (See Appendix C)

-3-

P10-40

IV CONCLUSIONS

From the comparisons in Appendices B and C it may be said that the "Instapak" packaging material appears to burn more severely than paper products.

cc: IBM (5)
Allendale (2)
TIF (2)
W.S. Marsh
A.E. Sheppard
J. S. Slicer

APPENDIX A

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PLAN VIEW

ELEVATION VIEW

APPENDIX B

Sprinklered Tests
(0.30 DENSITY)

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APPENDIX C

Free Burn Tests

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APPENDIX D
Free Burn Tests

P10-45

APPENDIX B
Controlled Burn
(Sprinklered Test 0.30 Density)

P10-46

REPORT No. YT-5111 DATE Feb. 7, 1975
SUBJECT Determine Self-ignition
Characteristics
CLIENT Instapak Corp.

REPORT NO.

PAGE

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ADMINISTRATIVE DATA

Test Report Number: YT-5111

Client: Instapak Corp.
Old Sherman Road
Danbury, Conn. 06810

Test Requested By: Dr. R.C. Ferris

Material Tested: Type S-1 Instapak Urethane
Packaging Foam

Purposes of Tests: To determine self-ignition characteristics at elevated temperatures.

Purchase Order Number: 43111

Date Test Completed: February 5, 1975

Test Conducted By: Consumer/Industrial Products Div.

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Purpose of Tests

Instapak Corporation, Danbury, Conn. 06810 submitted thirty 1" x 6" x 18" specimens of their Type S-1 urethane packaging foam to this laboratory for exploratory tests relating to "ignition"- or "fire-point" of the material when subjected to high environmental temperatures.

The object of the laboratory investigations would be to determine whether the S-1 foam would resist self-ignition at temperatures higher than the 286°F. "trigger" point of industrial fire sprinkler heads.

Method of Testing

The approach best suited for these high temperature tests was found to be available in the Radiant Panel Surface Flammability Apparatus developed by the National Bureau of Standards (ASTM Designation: E-162-67).

The high radiant temperature is provided by a cast iron fire box fitted with a 12" x 18" porous refractory mantle. Natural gas and air are fed into the fire box through a Venturi mixer. The mantle is then ignited with an open flame and the source of radiant heat allowed to rise and stabilize at its operating surface temperature of 1238°F. At this temperature, the normally beige colored mantle will have changed to a cherry red along with a slight veil of blue flame visible over the mantle's entire surface.

A steel frame, containing the specimen to be tested, is supported directly in front of the radiant panel at a 30° angle. The upper portion of the specimen is within 5" of the 1238°F. radiant heat source while the bottom of the slanting 18" long specimen is approximately 12" from the surface of the radiant panel.

Since the tests on Instapak S-1 Packaging Foam was to establish only self-ignition parameters, the pencil-thin acetylene pilot burner torch was not used. This burner is always employed in a regular E-162 surface flammability test to force ignition of the material under test so that the rate of burning, stack rise, etc., can be incorporated in the calculations from which the Flame Spread Index of a given material is established.

Test Findings

Initial tests on S-1 foam specimens were made with the radiant panel surface temperature at approximately 800°F. as indicated by thermocouples and electric pyrometer readout. After 15

P10-49

minutes exposure, the S-1 foam exhibited only moderate physical shrinkage and browning of the surface.

The surface temperature of the radiant panel was gradually increased with each new specimen tested until the full 1238°F. ASTM E-162 test level was reached.

With the radiant panel maintained at 1238°F. additional specimens were exposed for periods ranging from 15 minutes to one hour.

At the start of each test, the specimens emitted light gray smoke for from 1 to 1.25 minutes. Thereafter the specimen material closest to the panel surface began to shrink. Shrinkage and browning progressed slowly down the specimen but in decreasing degrees. The lower portion of the specimen materials showed little physical change. Whether exposed for periods of 15, 30, 45 or 60 minutes, no specimen burst into flame.

For purpose of comparison, the laboratory prepared 6" x 18" specimens of double wall corrugated box board and mounted these in the steel test frames.

Under the identical test conditions to which the S-1 foam was subjected, the box board burst into flame within 0.75 to 1 minute after exposure to the 1238°F. radiant heat. The corrugated board was totally consumed in 2.5 to 3 minutes elapsed time.

Since only the surface temperature of the radiant panel is a factor in the standard ASTM E-162 test, the laboratory decided to determine the actual temperature radiated to the surface of the foam specimens under test. Taking into consideration the 30° start of the specimen holder, thermocouple measurements showed a mean value of 495°F. which quickly ignited corrugated board, but produced only smoke, shrinkage and browning in the case of S-1 foam even after a full hour of high temperature exposure.

Comments

The impressive results obtained with Type S-1 Instapak urethane packaging foam apply expressly to elevated temperatures where no live flame is present. The foregoing test findings should in no manner be related to results obtained with urethane foam when tested to ASTM E-162 according to the exact procedures therein.

WHC-EP-0672

APPENDIX H

**WORK GUIDE PACKAGE FOR THE LOADING OF ADVANCED FUELS
LABORATORY SHIPPING PACKAGES**

WHC-EP-0672

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WORK GUIDE
LOADING OF AFL SHIPPING PACKAGES FOR SHIPMENT

1.0 PURPOSE

The purpose of this Work Guide (W/G) is to provide for the inspection, loading, labeling and release of shipping packages for shipment of radioactive waste materials from the AFL.

2.0 BASES

The bases for this W/G include:

- a) 10CFR 71, Appendix E
- b) NS&QA Procedure QAP-1
- c) RHO-MA222 (Hanford Radioactive Solid Waste Packaging, Storage and Disposal Requirements, dated May 1980)
- d) Model #6400 (Super Tiger) Certificate of Compliance #6400, Rev. 9, dated November 20, 1981.

3.0 REFERENCES

- 3.1 POI 10.12, Rev. 4 (QA Implementation for AFL Transuranic Waste Shipping)
- 3.2 POI No. 10.13, Rev. 1 (QA Implementation for AFL Radioactive Material Shipping Packages)
- 3.3 POI No. 6.2.15.2, Rev. 1 (Application of Fiberglass to Wooden Shipping/Burial Waste Containers).
- 3.4 POI No. 6.1.9, Rev. 0 (Transfer of AFL Equipment through RHO)

4.0 ATTACHMENTS

- 4.1 Attachment I - Sequence of Events (Example GE Model 9136)
- 4.2 Attachment II - Travel Card (Typical)
- 4.3 Attachment III - Model #6400 Super Tiger Requirements
- 4.4 Attachment IV - Travel Card for 9136 Pkg. (Without Inner Container) in Super Tiger
- 4.5 Attachment V - Travel Card for 9136 Pkg. (With Inner Container) in Super Tiger
- 4.6 Attachment VI - Model #6400 Super Tiger Trip Inspection Checklist

GENERAL REVISION

WORK GUIDE
LOADING OF AFL SHIPPING PACKAGES FOR SHIPMENT

5.0 INSTRUCTIONS

5.1 Definitions

5.1.1 Storage Package - A package which has been approved by Rockwell Hanford Operations (RHO) for storage of radioactive waste. Examples are: a) 17H/17C 55-gal. drums, and
b) GE Packaging Model #9136

5.1.2 Shipping Package - A container which provides for the primary containment, with its contents, as presented to a carrier for transport. Examples are:
a) Model No. N-55 overpacks,
b) GE Packaging Model #9136, and
c) Model #6400 Super Tiger

5.2 General

All radioactive waste shipping packages, with the exception of LSA packages, require documented inspection by or with QA supervision and QA release prior to loading. Release of shipping packages shall be accomplished by execution of an AFL Release form, (QA engineer responsibility). Loading shall be accomplished and documented in accordance with the requirements of an approved loading checklist, (Shipping and Accountability Clerk responsibility)

Note: Loading checklist(s) may be incorporated in the Travel Card.

WORK GUIDE
LOADING OF AFL SHIPPING PACKAGES FOR SHIPMENT
ATTACHMENT I

(Sequence of Events - GE Packaging Model #9136 Shipping/Storage Packages)

- A. Fabrication Acceptance (QA Responsibility)
 - 1. MR approval (for vendor fabrication)
 - 2. W/G approval (for in-house fabrication)
 - 3. In-process surveillance during fabrication
 - 4. Acceptance of vendor fabricated packages for signature on certificate of conformance and QA release tag or
 - 5. Acceptance of in-house fabricated packages by execution of an AFL Release form (release for fiberglassing).
- B. Fiberglass Reinforced Polyester (FRP) Acceptance (QA Responsibility)
 - 1. In-process surveillance of FRP (including prep work)
 - 2. Preparation of Receiving Inspection Plans (RIPs) for inspection of FRP covered packages at AFL
 - 3. Release of packages for loading by execution of an AFL Release form
- C. FRP Inspection
 - 1. Perform FRP inspection in accordance with RIP (Includes NCR preparation for nonconformances) - L.O. responsibility, QA assistance as requested.
 - 2. Review RIPs, release acceptable packages for loading, participate in disposition of NCRs for nonconforming items. (QA responsibility)
- D. Package Loading
 - 1. Provide approved loading checklist (Shipping & Accountability Clerk and L.O. Supervisor responsibility)
 - 2. Install cribbing, eyebolts, and contents in accordance with approved sketches, drawings, and loading checklists. (L.O. responsibility)
 - 3. Documentation and approval of package loading shall be provided by the Supervisor, L.O. prior to lid installation.
 - a) Fabrication and installation of additional cribbing
 - b) Equipment decontamination
 - c) Equipment release by VNC NS&QA
 - d) Equipment filters changed
 - e) Equipment interior painted
 - f) Monitor surveys of equipment and packaging

WORK GUIDE
LOADING OF AFL SHIPPING PACKAGES FOR SHIPMENT
ATTACHMENT I (Continued)

E. Lid Installation

1. Lid shall be glued in place with water resistant glue, bolted per drawing requirements, and nailed with 8d drive screw nails on a 4" nominal spacing to 2" x 4" rails and 2" x 12" subfloor.
2. When a minimum of 3-4 packages have been loaded (complete with lid installation), notify FRP vendor. FRP vendor will bring spray equipment to VNC, prep. and coat package lid seal area and eyebolt fasteners (if not previously coated) per POI 6.2.15.2 requirements, rework/repair FRP coating as required by authorized disposition per NCRs, fill depth measurement holes (drilled to verify FRP thickness), and apply a coat of clear resin to all areas not previously coated with clear resin.

F. Lid Seal FRP Application Inspection

1. Verify resin and fiberglass meets POI 6.2.15.2 requirements, eg., Resin: HETRON 435 P or equivalent; Fiberglass: Continuous roving with red tracer.
2. Verify FRP thickness (at least one location on each top, both sides and bottom) immediately after rolling (before FRP cures).

NOTE: The 3 sided qualification test panel should be used to check out the FRP system by coating at least a section of the lid seal area prior to first time FRP coating of actual package lid seals.

G. Verify FRP thickness on eyebolts before FRP cures.

H. Verify FRP thickness drill holes are filled (filling with clear resin or CAB-O-SIL putty followed by a clear resin coat shall be acceptable).

I. Package Labeling

After completion of E.2, all labeling as required by the packaging drawing and RHO-MA-222 shall be performed by AFL personnel.

NOTE: Clear resin coating of labeling performed by AFL will be accomplished by a vendor at time of lid seal/package clear coating providing labeling has been accomplished. Clear resin coating of labeling performed after vendor completion shall be the responsibility of the AFL.

J. Verify labeling is coated with clear resin and that labeling is legible after coating.

K. Verify loading checklist is complete and accepted by the Shipping and Accountability Clerk.

L. Verify Travel Card is complete and accepted by the Supervisor L.O., Manager AFL., and QA.

M. Verify all package labeling.

N. Verify DOE Acceptance Form signed by DOE representative.

ATTACHMENT II

TRAVEL CARD

GE Model 9136 Storage/Shipping Package (FRP Application thru Shipping)

Model 9136 Shipping Package S/N _____

When Task is Completed
Sign and DateHold Point
No. 1A. Released for loading by QA? Yes ☐ _____B. Cribbing/hardware installation
(before loading)1. Additional Cribbing Fabricated:

Technician _____ Date _____

2. Sketch/Drawing Number & Rev.

• Right End

Drawing No. _____ Rev. _____

• Left End

Drawing No. _____ Rev. _____

• Back

Drawing No. _____ Rev. _____

• Top

Drawing No. _____ Rev. _____

• Front

Drawing No. _____ Rev. _____

3. Eyebolt installation completed:

Technician _____ Date _____

Comments: _____

_____C. Loading

1. Contents Identification _____

2. Contents/Equipment
Decontaminated

LO Supervisor _____ Date _____

3. Released by NS & QA

LO Supervisor _____ Date _____

4. Released Activity
(total mCi) _____

LO Supervisor _____ Date _____

5. Contents/Equipment
Filters Changed

Technician _____ Date _____

ATTACHMENT II

TRAVEL CARD

GE Model 9136 Storage/Shipping Package (FRP Application thru Shipping)

Model 9136 Shipping Package S/N _____

When Task is Completed
Sign and Date

6. Contents/Equipment
Interior Painted

Technician Date

7. Windows, Glove & Bag Port
covers installed

L.O. Supervisor

8. Contents/Equipment removed
from ventilation

L.O. Supervisor

9. Monitor Survey of Equip. No. _____
measure dose rate at contact,
3 ft. and external smearable
contamination.

- a) MR/hr at contact _____
b) MR/hr at 3 feet _____
c) c/m smearable Beta/Gamma _____
d) d/m smearable Alpha _____

NS&QA Monitor Date

Comments: _____

- D. Final Cribbing/hardware installation
(after loading)

1. Eyebolt installation completed

2. Contents fastened with cables - all
turnbuckles tightened

3. Ready for Lid Installation (Super. L.O.)

Comments: _____

Hold Point
No. 2

ATTACHMENT II

TRAVEL CARD

GE Model 9136 Storage/Shipping Package (FRP Application thru Shipping)

Model 9136 Shipping Package S/N _____

When Task is Completed
Sign and Date

E. Lid Installation

1. Lid S/N _____
2. Lid glued with H₂O resistant glue
3. Lid bolted in place (bolts & lag screws)
4. Lid nailed to 2" x 4" rails and 2" x 12" subfloor on 4" nominal spacing with 8d drive screw nails

Comments: _____

Hold Point
No. 3

F. Package ready for FRP lid seal

Comments: _____

Supervisor, L.O.

G. FRP Application - Lid Seal

1. Resin: Brand/Type _____
Batch No. _____
Date _____

2. Fiberglass: Brand/Type _____

Red Tracer ☐ Yes

Comments: _____

3. FRP thickness: Top _____
(Spec. = $\geq$ 0.130") Sides _____
Bottom _____

Comments: _____

ATTACHMENT II

TRAVEL CARD

GE Model 9136 Storage/Shipping Package (FRP Application thru Shipping)

Model 9136 Shipping Package S/N _____

When Task is Completed
Sign and Date

H. FRP Application - Eyebolt

FRP thickness - Record for each eyebolt

(Spec. = $\geq 0.130"$) _____

I. FRP Application - Thickness Verification Holes

All thickness measurement
holes filled☐

Yes

J. Labeling

1. Labeled per Dwg. No. _____

2. RRM Number

3. Gross Weight

4. TRU Waste

5. "Lift Here"

* 3" Lettering on top,
right side and front_____
Technician DateComments: _____

K. Clear Resin Application

*a) Applicable labels coated
with clear resin☐

Yes

*b) Labels legible after
coating☐

Yes

c) Affix proper marking and
labeling required by State
and Federal Regulations
(Resin Coating not required)_____
Traffic Coordinator Date*RRM No.
Gross Wt.
TRU Waste
"Lift Here"

ATTACHMENT II

TRAVEL CARD

GE Model 9136 Storage/Shipping Package (FRP Application thru Shipping)

Model 9136 Shipping Package S/N _____

When Task is Completed
Sign and Date _____

- L. Monitor Survey (after lid is sealed and prior to loading on truck) measure dose rate at contact, 3 ft. and external smearable contamination.

- a) MR/hr at contact _____
 b) MR/hr at 3 feet _____
 c) c/m smearable Beta/Gamma _____
 d) c/m smearable Alpha _____

NS&QA Monitor Date

- M. Prepare all the proper shipping papers Check When Completed
and documents required.

- a) Radioactive Materials Packaging Record (NEBG 374) _____
 b) Solid Waste Burial Record (54-3000-581) _____
 c) TRU Dry Waste Storage Form (BC-6800-076) _____

Shipping & Accountability
ClerkHold Point
No. 4

N. Travel Card is complete and accepted by:

Supervisor, Laboratory Operations

Date _____

Manager, Advanced Fuels Laboratory

Date _____

Q. A. Engineer

Date _____

ATTACHMENT II

TRAVEL CARD

GE Model 9136 Storage/Shipping Package (FRP Application thru Shipping)

Model 9136 Shipping Package S/N _____

When Task is Completed
Sign and Date

O. DOE Acceptance Form signed by the
DOE representative.

Shipping & Accountability
Clerk

Date

P. Package released for shipment by Q.A.

Q.A. Engineer

Date

Q. Package is loaded on transport
vehicle, tied down and tarped
for shipment.

Shipping & Accountability
Clerk

Date

ATTACHMENT III
Model 6400 Super Tiger Requirements

Packaging

The contents to be transported in the Model 6400 overpack will be contained within Model GE-9136 packaging. Equipment not easily fitted with mechanical closures, e.g., metal caps or gasketed bolt-on flanges, will be further contained within a second inner wooden box. The space between the contents and the packaging will be filled with a rigid polyurethane foam.

The second wooden box will be fabricated using 3/4" plywood on 2" x 4" framing with joints glued and nailed.

Contents

- (a) The space between the contents and the packaging will be filled with a rigid polyurethane foam to a minimum thickness of 1 inch. Void spaces between the contents will be filled with foam (1/2" minimum thickness).
- (b) Equipment contents capable of mechanical closure will be fitted with gasketed metal flanges before loading into the 9136 type packaging.
- (c) Contents will be less than 20 curies and less than 15 grams fissile.
Note: All contents except glassware will be less than 0.5 Ci.
Glassware will be less than 2.0 Ci.
- (d) The maximum weight of the contents including the 9136 type second inner packaging, and all dunnage, shoring and bracing will not exceed 30,000 pounds.
- (e) Sufficient dunnage, shoring and/or bracing will be utilized to minimize secondary impact of the secondary packaging within the cavity.
- (f) Secondary (9136-type) packaging will be positioned in the 6400 cavity such that the center of gravity of the loaded package is substantially the same as the center of gravity of an empty package.
- (g) Outer surfaces will have a smearable level of contamination no greater than 20 d/m/100/cm².

ATTACHMENT III (Continued)
Model 6400 Super Tiger Requirements

- (h) Equipment waste will be inspected prior to packaging for shipment to assure that protruding objects or sharp corners are blunted or suitably protected to prevent damage to the shipping container. The equipment will be secured to prevent movement during shipment.
- (i) Equipment items which cannot be sealed using mechanical fittings such as heavy walled process glassware, stainless steel transfer tubes, HEPA filters not in filter housings and round ducting will be capped or double bagged in 12 mil thick PVC with each bag heat sealed. These items will be further protected and restrained in a strong, tight, glued joint plywood container to prevent movement during transport. The plywood container (see G.E. sketch Nos. 272E81-4, 272E81-28, 272E81-29, 272E81-30 or 272E81-31) will be secured in 9136-type packaging.
- (j) The cavity of the overpack must be vented through an absolute filter to equalize pressure between the outside and inside of the overpack.

ATTACHMENT IV
TRAVEL CARD
GE Model 9136 Storage Package (without Inner Container)
for Super Tiger Shipment

Model 9136 Package S/N _____

When Task is Completed
Sign and Date

Hold Point
No. 1

A. Released for loading by QA?

LO Supervisor

Date

B. Cribbing/hardware installation
(before loading)

1. Additional Cribbing Fabricated:

Technician

Date

2. Sketch/Drawing Number & Rev.

• Right End

Drawing No.

Rev.

• Left End

Drawing No.

Rev.

• Back

Drawing No.

Rev.

• Top

Drawing No.

Rev.

• Front

Drawing No.

Rev.

3. Eyebolt installation completed:

Technician

Date

Comments: _____

C. Loading

1. Contents Identification _____

2. Contents/Equipment
Decontaminated

LO Supervisor

Date

3. Released by NS & QA

LO Supervisor

Date

4. Released Activity
(total mCi) _____

LO Supervisor

Date

5. Contents/Equipment
Filters Changed

Technician

Date

ATTACHMENT IV

TRAVEL CARD

GE Model 9136 Storage Package (without Inner Container)
for Super Tiger Shipment

Model 9136 Package S/N _____

When Task is Completed
Sign and Date

6. Contents have all openings
mechanically sealed, eg.,
gasketed flanges - pipe caps
or covers

☐

OR

Contents are double bagged
with PVC

☐

(Check applicable box)

Technician Date

7. Contents are fixed with
strip, clear or paint
coating

Technician _____

8. Contents have sharp corners
blunted or suitably pro-
tected

Technician _____

9. Windows, Glove & Bag Port
covers installed

Technician Date

10. Contents/Equipment removed
from ventilation

Technician Date

11. Monitor Survey of Equip. No. _____
measure dose rate at contact,
3 ft. and external smearable
contamination.

- a) MR/hr at contact _____
b) MR/hr at 3 feet _____
c) c/m smearable Beta/Gamma _____
d) d/m smearable Alpha _____

NS&QA Monitor Date

Comments: _____

ATTACHMENT IV

TRAVEL CARD

GE Model 9136 Storage Package (without Inner Container)
for Super Tiger Shipment

Model 9136 Package S/N _____

When Task is Completed
Sign and Date

12. Final Cribbing/hardware installation
(after loading)

- a) Eyebolt installation completed
- b) Contents fastened with cables - all
turnbuckles tightened

Technician Date

D. Contents are foamed in place

- 1. Foam thickness is 1 in. (min.)
between contents & packaging
- 2. Foam thickness is 1/2 inch
(min.) between content
components

Technician Date

E. Lid Installation

- 1. Lid S/N _____
- 2. Lid glued with H₂O resistant glue
- 3. Lid bolted in place (bolts & lag screws)
- 4. Lid nailed to 2" x 4" rails and 2" x 12"
subfloor on 4" nominal spacing with 8d
drive screw nails

Comments: _____

Hold Point
No. 3

F. Package ready for FRP lid seal

Comments: _____

Supervisor, L.O.

ATTACHMENT IV

TRAVEL CARD

GE Model 9136 Storage Package (without Inner Container)
for Super Tiger Shipment

Model 9136 Package S/N _____

When Task is Completed
Sign and Date

G. FRP Application - Lid Seal

1. Resin: Brand/Type _____
Batch No. _____
Date _____

2. Fiberglass: Brand/Type _____

Red Tracer ☐ Yes

Comments: _____

3. FRP thickness: (lid seal) Top _____
(Spec. = ≥ 0.130 ") Sides _____
Bottom _____

Comments: _____

H. FRP Application - Eyebolt

FRP thickness - Record for each eyebolt

(Spec. = ≥ 0.130 ") _____

I. FRP Application - Thickness Verification Holes

All thickness measurement
holes filled

☐ Yes

**ATTACHMENT IV
TRAVEL CARD
GE Model 9136 Storage Package (without Inner Container)
for Super Tiger Shipment**

Model 9136 Package S/N _____

**When Task is Completed
Sign and Date**

J. Labeling

1. Labeled per Dwg. No. _____
2. RRM Number _____
3. Gross Weight } * 3" Lettering on top,
4. TRU Waste } right side and front
5. "Lift Here" _____

Comments: _____

Technician

Date

K. Clear Resin Application

- *a) Applicable labels coated with clear resin ☐ Yes _____
- *b) Labels legible after coating ☐ Yes _____
- c) Affix proper marking and labeling required by State and Federal Regulations (Resin Coating not required). _____

Traffic Coordinator Date

L. Monitor Survey (after lid is sealed and prior to loading in Super Tiger) measure dose rate at contact, 3 ft. and external smearable contamination.

- a) MR/hr at contact _____
- b) MR/hr at 3 feet _____
- c) c/m smearable Beta/Gamma _____
- d) c/m smearable Alpha _____

NSEQA Monitor Date

*RRM No.
Gross Wt.
TRU Waste
"Lift Here"

ATTACHMENT IV

TRAVEL CARD

GE Model 9136 Storage Package (without Inner Container)
for Super Tiger Shipment

Model 9136 Package S/N _____

When Task is Completed
Sign and Date

M. Prepare all the proper shipping papers Check When Completed
and documents required.

- a) Radioactive Materials Packaging Record (NEBG 374) _____
- b) Solid Waste Burial Record (54-3000-581) _____
- c) TRU Dry Waste Storage Form (BC-6800-076) _____

Shipping & Accountability _____
Clerk

Hold Point No. 4 N. Travel Card is complete and accepted by:

Supervisor, Laboratory Operations Date _____

Manager, Advanced Fuels Laboratory Date _____

Q. A. Engineer Date _____

O. Package released for loading into
Super Tiger

Q.A. Engineer Date _____

ATTACHMENT V

TRAVEL CARD

GE 9136 Packaging (with Inner Container) for Super Tiger Shipment

Model 9136 Package S/N _____

When Task is Completed
Sign and DateHold Point
No. 1

A. Released for loading by QA?

LO Supervisor DateB. Cribbing/hardware installation
(before loading)1. Additional Cribbing Fabricated:Technician Date

2. Sketch/Drawing Number & Rev.

• Right End

Drawing No. Rev.

• Left End

Drawing No. Rev.

• Back

Drawing No. Rev.

• Top

Drawing No. Rev.

• Front

Drawing No. Rev.3. Required eyebolts installed:
(before contents are loaded)Technician Date

Comments: _____

C. Inner Container (Fab. & Loading)

1. Sketch No. _____

2. Contents Identification _____

3. Contents/Equipment
DecontaminatedLO Supervisor Date

4. Released by NS & QA

LO Supervisor Date5. Released Activity
(total mCi) _____LO Supervisor Date6. Contents/Equipment
Filters ChangedTechnician Date

ATTACHMENT V
TRAVEL CARD
GE 9136 Packaging (with Inner Container) for Super Tiger Shipment
Model 9136 Package S/N _____

When Task is Completed
Sign and Date

7. Contents have all openings mechanically sealed, eg., gasketed flanges - pipe caps or covers

☐

OR

Contents are double bagged with PVC

☐

(Check applicable box)

	_____
Technician	_____
Date
8. Contents are fixed with strip, clear or paint coating	_____
Technician	_____
9. Contents have sharp corners blunted or suitably protected	_____
Technician	_____
10. Windows, Glove & Bag Port covers installed	_____
Technician	_____
Date
11. Contents/Equipment removed from ventilation	_____
Technician	_____
Date
12. Monitor Survey of Equip. No. _____
measure dose rate at contact,
3 ft. and external smearable contamination.		
a) MR/hr at contact	_____	
b) MR/hr at 3 feet	_____	
c) c/m smearable Beta/Gamma	_____	
d) d/m smearable Alpha	_____	
	_____
NS&QA Monitor	_____
Date

Comments: _____

ATTACHMENT V

TRAVEL CARD

GE 9136 Packaging (with Inner Container) for Super Tiger Shipment
Model 9136 Package S/N _____

When Task is Completed
Sign and Date

13. Contents are foamed in place
- Foam thickness is 1 in. (min.) between contents & packaging
 - Foam thickness is 1/2 inch (min.) between content components
 - Inner container cover glued and nailed in place
 - Inner container released for loading into 9136 packaging

Technician Date

LO Supervisor _____

D. Model 9136 Loading

Final Cribbing/hardware installation
(after loading)

- Eyebolt installation completed
- Contents fastened with cables - all turnbuckles tightened

Technician Date

- Ready for Lid Installation (Super. LO.)

Comments: _____

E. Lid Installation

- Lid S/N _____
- Lid glued with H₂O resistant glue
- Lid bolted in place (bolts & lag screws)
- Lid nailed to 2" x 4" rails and 2" x 12" subfloor on 4" nominal spacing with 8d drive screw nails

Comments: _____

Hold Point
 No. 2

ATTACHMENT V

TRAVEL CARD

GE 9136 Packaging (with Inner Container) for Super Tiger Shipment

Model 9136 Package S/N _____

When Task is Completed
Sign and Date

Hold Point F. Package ready for FRP lid seal

No. 3

Comments: _____

Supervisor, L.O.

G. FRP Application - Lid Seal

1. Resin: Brand/Type _____
Batch No. _____
Date _____

2. Fiberglass: Brand/Type _____

Red Tracer ☐ Yes

Comments: _____

3. FRP thickness: (lid seal) Top _____
(Spec. = $\geq 0.130"$) Sides _____
Bottom _____

Comments: _____

H. FRP Application - Eyebolt

FRP thickness - Record for each eyebolt

(Spec. = $\geq 0.130"$) _____

I. FRP Application - Thickness Verification Holes

All thickness measurement
holes filled

☐ Yes _____

ATTACHMENT V

TRAVEL CARD

GE 9136 Packaging (with Inner Container) for Super Tiger Shipment

Model 9136 Package S/N _____

When Task is Completed
Sign and Date

J. Labeling

1. Labeled per Dwg. No. _____
2. RRM Number _____
3. Gross Weight } * 3" Lettering on top,
4. TRU Waste } right side and front
5. "Lift Here" _____

Technician DateComments: _____

K. Clear Resin Application

- *a) Applicable labels coated with clear resin ☐ Yes _____
- *b) Labels legible after coating ☐ Yes _____
- c) Affix proper marking and labeling required by State and Federal Regulations (Resin Coating not required). _____

Traffic Coordinator DateL. Monitor Survey (after lid is sealed)
measure dose rate at contact,
3 ft. and external smearable
contamination.

- a) MR/hr at contact _____
- b) MR/hr at 3 feet _____
- c) c/m smearable Beta/Gamma _____
- d) c/m smearable Alpha _____

NS&QA Monitor Date

*RRM No.
Gross Wt.
TRU Waste
"Lift Here"

ATTACHMENT V
TRAVEL CARD
GE 9136 Packaging (with Inner Container) for Super Tiger Shipment
Model 9136 Package S/N _____

When Task is Completed
Sign and Date

- M. Prepare all the proper shipping papers Check When Completed
and documents required.
- a) Radioactive Materials Packaging Record (NEBG 374) _____
 - b) Solid Waste Burial Record (54-3000-581) _____
 - c) TRU Dry Waste Storage Form (BC-6800-076) _____

Shipping & Accountability
Clerk _____

Hold Point
No. 4

N. Travel Card is complete and accepted by:

Supervisor, Laboratory Operations

Date _____

Manager, Advanced Fuels Laboratory

Date _____

Q. A. Engineer

Date _____

O. Package released for loading into
Super Tiger

Q.A. Engineer

Date

ATTACHMENT VI

Trip Inspection Checklist for Super Tiger PackageShipment No. _____ Contents (Mod. 9136 S/N) _____
_____When Step is Completed
Sign & Date

A. Monitor Survey No. _____ (Empty Container)

1. c/m smearable Beta/Gamma _____
2. d/m smearable Alpha _____

B. All welds are free of visible cracks

C. *

1. All threaded fasteners visually acceptable
2. Dowel pins visually acceptable
3. Vent plugs and absolute filter in place and visually acceptable
4. Inner door seal gasket visually acceptable
5. Tiedown fasteners visually acceptable
6. Corner castings visually acceptable
7. Inner and outer door hinges operable
8. Inner and outer door alignment visually acceptable
9. Container is visually free of design modifications

* As compared to condition upon initial receipt from the owner

Comments: _____

D. Container is loaded such that the center of gravity is essentially unaltered

E. Secondary packaging is provided with sufficient shoring and/or bracing

F. Total weight of contents does not exceed 30,000 pounds

G. Total fissile contents are less than 15 grams and less than 20 Ci

ATTACHMENT VI (Continued)

Trip Inspection Checklist for Super Tiger Package

Shipment No. _____

When Step is Completed
Sign & Date

- H. All threaded devices and door hinges lubricated with anti-seize compound
- I. All inner door bolts in place and torqued to 40-50 ft-lbs.
- J. All outer door bolts in place and torqued to 250-300 ft-lbs
- K. Affix proper marking and labeling required by State and Federal Regulations

Traffic Coordinator Date

- L. Loaded container released for shipment by:
- Supervisor, Laboratory Operations
- Manager, Advanced Fuels Laboratory
- Quality Assurance

- M. DOE Acceptance Form signed by the DOE representative.

Shipping & Accountability Clerk Date

- N. Super Tiger loaded on transport vehicle, tied down and tarped for shipment

Shipping & Accountability Clerk Date

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APPENDIX I

DOE ACCEPTANCE FORM FOR WASTE GENERATED AT GE-FL

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RRM-3597-26
December 5, 1980
(SAN OCC Revised)

DOE ACCEPTANCE FORM FOR WASTE
GENERATED AT GE-FL

General Electric Company
Vallecitos Road
Pleasanton, CA 94566

(ATTENTION: M. L. Thompson)

Reference: Letter XL-895-00559, E. F. Kurtz to S. G. Harbison, subject:
"Waste Shipments to DOE-Hanford Waste Facility," dated
December 9, 1980.

This will acknowledge delivery by GE and receipt by the undersigned authorized representative of the U.S.-DOE, within the confines of General Electric Company's Vallecitos Nuclear Center (VNC), of a stated quantity of radioactive solid waste generated as a result of R&D activities in connection with performance of DOE contracts. This waste is packed in approved shipping packages. This receipt is made on the basis of certification by GE that these packages were loaded, closed, and sealed by GE in accordance with the requirements of DOE and NRC for shipping and transportation, the requirements of the carrier as accepted by DOE, and the requirements of Rockwell-Hanford for acceptance and disposal, unless otherwise excepted by DOE, in writing, as indicated by checklists, packing lists, and other documents associated with this shipment. DOE hereby acknowledges ownership of said material and agrees to assume responsibility consistent with that ownership.

The shipping packages will be loaded by GE at VNC per DOE direction for transportation to a DOE waste burial site on Government Bill of Lading No.

A126029

Name _____ Date 7/27/82
U.S. Department of Energy

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APPENDIX J

**DATA ON GE VALLECITOS NUCLEAR CENTER WASTE GENERATION
FROM THE SOLID WASTE INFORMATION TRACKING SYSTEM**

The information found in this appendix is from the Solid Waste Information and Tracking System (SWITS) database. This database incorporates the older R-SWIMS database and is used to track information on radioactive and other wastes stored or disposed at the Hanford Site.

Each SWITS data run in this appendix is preceded by the query used to generate the data. A brief explanation of the run and any additional information needed to understand the data presented is also included.

The bulk of the data provided is limited to information about TRU waste generated at VNC; however, some general information on the non-TRU waste is included for completeness. The term non-TRU is used instead of LLW because a small percentage of the waste has been designated only as not TRU. It is believed that most, if not all, of the non-TRU waste is LLW.

The data runs in this appendix are further segregated by waste container type. Since initial retrieval efforts and WRAP 1 will focus on 55-gal drums, these container types are considered separately. There are also runs separating waste generated in 1974 from waste generated between 1981 and 1983.

Some general information about the SWITS database and the codes used follows. Please note the disclaimer found on the next page.

DON'T SAY IT --- Write It !

Date:

To: *Judy Pattmeyer*

From: Solid Waste Engineering Data Management Group
N3-11 6-4394/6-4020

Re: SWITS DATA REQUEST

Attached for your information and use is the data which you requested. This data represents best available information regarding wastes currently in storage at the Hanford Site. I trust the information will be suitable to your needs.

Requests for information from the Solid Waste Information and Tracking System (SWITS) are normally relatively limited in scope, requesting specific data fields or summary data. The responses to these requests undergo review during data collection, summary and response preparation.

The response to this request represents a simple reproduction of the SWITS Database. Transmittal of this information is made with the following disclaimers:

- 1) The information contained in this transmittal is raw data, and represents information provided to Solid Waste Engineering (SWE) on burial records or other documents. This data has not been validated.
- 2) The information contained in this transmittal is subject to change without notice. Continual update of SWITS information and improvement of the software system make it impossible to ensure consistency of this data with the database after transmittal.
- 3) This information is current as of 12/11/92.

If I can be of further assistance to you, do not hesitate to call me.

SWIR401

Solid Waste Information and Tracking System

05/01/92

13:25

Page: 1

Primary Waste Type Code Table

Primary Waste Type Code	Primary Waste Type Description	Ship Time	Rad
AH	HAS, ADMIN HOLD	89	N
CM	MORATORIUM CONTROLLED	89	N
H	HAZARDOUS	89	N
HP	HAZARDOUS WASTE PCB	29	N
M	MIXED	89	Y
MP	MIXED PCB	29	Y
N	NON-REGULATED		N
P	PCB	29	N
R	RADIOACTIVE		Y
RP	RADIOACTIVE PCB	29	Y
U	UNKNOWN		N

SWIR402

Solid Waste Information and Tracking System

05/01/92

13:26

Page: 1

Secondary Waste Type Code Table

Secondary Waste Type Code	Secondary Waste Group	Secondary Waste Type Description
1A	TRU	TRANSURANIC (NOT PROCESSED THROUGH TRUSAF)
1B	TRU	TRANSURANIC CLASSIFIED
1C	TRU	TRANSURANIC WIPP CERTIFIED
1D	TRU	TRANSURANIC WIPP UNCERTIFIED
1E	TRU	TRANSURANIC SPECIAL CASE
1F	TRU	TRANSURANIC CAISSONS
2A	LLW	LOW-LEVEL NON-INDUSTRIAL
2B	LLW	LOW-LEVEL NON-INDUSTRIAL CLASSIFIED
2F	LLW	LOW-LEVEL CAISSONS
2L	LLW	LOW-LEVEL NON-INDUSTRIAL (ASSAYED FROM TRU)
3A	LLW	LOW-LEVEL INDUSTRIAL
3L	LLW	LOW-LEVEL INDUSTRIAL (ASSAYED FROM TRU)
4A	HLW	HIGH LEVEL WASTE (SPENT FUEL)
UA	USG	UNSEGREGATED NON-TRANSURANIC DRY WASTE
UB	USG	UNSEGREGATED NON-TRANSURANIC INDUSTRIAL
UC	USG	UNSEGREGATED CAISSONS (REMOTE HANDLED)
UF	USG	UNSEGREGATED TRANSURANIC/LOW-LEVEL (TUNNELS PUREX)
UG	USG	UNSEGREGATED TRANSURANIC DRY WASTE
UJ	USG	UNSEGREGATED TRANSURANIC INDUSTRIAL

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APPENDIX J.1

**CONTAINER NUMBER AND WEIGHT OF TRU WASTE
IN 55-GALLON DRUMS BY WASTE TYPE**

This data run gives an overall look at the waste types, container numbers, and total weight (in kilograms) of the radioactive wastes generated at VNC on a yearly basis. These data are for wastes stored in 55-gal drums only. The meanings of primary and secondary waste codes can be found in the introductory materials for this appendix.

The data in the average weight column should be taken cautiously, especially for LLW codes. Concern is warranted because LLW records are still done on a batch basis. This means that one weight or volume datum may be the composite for a group of drums. This computer program simply divided the sum of all values by the number of values used to compute the total, not the actual number of containers which that value represents.

From 1970 until 1978 individual container weights were not required for TRU drums. During the data re-entry program in the mid-1980's standard weights were assigned for all container types; 55-gal drums were given a standard weight of 68 kg. This is why the average weight/drum for TRU is so consistent during this period.

```

set linesize 170
set pagesize 45
set newpage 0
spool pot2a.srep
title center 'VAL' -
right 'Page:' format 999 sql.pno skip 1
break on dt skip 1
compute sum of sum(con_gross_wgt) on dt
compute sum of sum(rdet_rswims_count) on dt
compute sum of sum(con_cntr_vol) on dt
col dt                                format a4          heading "Date"
col con_pwtyp_cd                      format a4          heading "Pri|Wast|Type"
col rdet_swtyp_cd                     format a4          heading "Sec|Wast|Type"
col sum(rdet_rswims_count)            format 999999       heading "Count"
col avg(con_gross_wgt)                format 99999.99     heading "Avg|Weight"
col sum(con_gross_wgt)                format 9999999.99     heading "Sum|Weight"
col sum(con_cntr_vol)                 format 99999.99     heading "Sum|Vol"
col avg(con_cntr_vol)                 format 99999.99     heading "Avg|Vol"
col cntyp_descr                       format a30         heading "Container Description"
col con_size_descr                    format a25         heading "Container Size"
select cntyp_descr,
       con_size_descr,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
       con_pwtyp_cd,
       rdet_swtyp_cd,
       sum(rdet_rswims_count),
       sum(con_gross_wgt),
       avg(con_gross_wgt),
       sum(con_cntr_vol),
       avg(con_cntr_vol)
from radwaste, contype
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and con_size_descr = '55 GALLON' and con_cntyp_cd = cntyp_cd
group by cntyp_descr,
       con_size_descr,
       con_pwtyp_cd,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4),
       rdet_swtyp_cd
;
spool off

```


Container Description	Container Size	Date	Pri	Sec	Last	Type	Count	VAL		Sum	Avg	Vol	Avg	Vol
								Weight	Weight					
METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	1A				52	7188.50	138.24	11.02		.21		

		Sum					52	7188.50		11.02				
METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	1A				34	3452.74	101.55	7.21		.21		
METAL DRUMS, BARRELS, KEGS	55 GALLON	M	2A				8	1032.37	516.19	1.70		.85		

		Sum					42	4485.11		8.91				
METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	1A				24	3934.44	163.94	5.09		.21		
METAL DRUMS, BARRELS, KEGS	55 GALLON	R	2A				8	884.05	884.05	1.70		1.70		

		Sum					32	4818.49		6.79				
METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	1A				40	5000.38	125.01	8.48		.21		

		Sum					40	5000.38		8.48				

6 rows selected.

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APPENDIX J.2

GE VALLECITOS NUCLEAR CENTER TRU WASTE CONTAINERS

WHC-EP-0672

This subappendix provides information on VNC TRU waste containers, weight, volume and primary waste types stored at various TRU waste storage facilities on the Hanford Site. The data provide the data from TRU waste generated in 1974 in a separate SWITS run than the waste generator between 1981 and 1983.

```

set linesize 170
set pagesize 44
set newpage 0
spool pot3.srep
tttitle center 'TRU WASTE- VAL' -
right 'Page:' format 999 sql.pno skip 1
break on dt skip 1
compute sum of sum(con_gross_wgt) on dt
compute sum of sum(rdet_rswims_count) on dt
col dt                                format a4          heading "Date"
col con_pwtyp_cd                      format a4          heading "Pri|Wast|Type"
col rdet_swtyp_de                     format a4          heading "Sec|Wast|Type"
col sum(con_gross_wgt)                format 999999.99      heading "Weight"
col sum(rdet_rswims_count)            format 99999          heading "Count"
col avg(con_gross_wgt)                format 99999.99      heading "Avg|Weight"
col sum(con_cntr_vol)                 format 99999.99      heading "Volume"
col avg(con_cntr_vol)                 format 99999.99      heading "Avg|Volume"
col cntyp_descr                       format a55          heading "Container Discription"
col con_size_descr                    format a45          heading "Container Size"
col con_locn_facil_id                 format a8          heading "Facility"
select
    cntyp_descr,
    con_size_descr,
    substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
    con_pwtyp_cd,
    con_locn_facil_id,
    sum(rdet_rswims_count),
    sum(con_gross_wgt),
    avg(con_gross_wgt),
    sum(con_cntr_vol),
    avg(con_cntr_vol)
from radwaste, cntype
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and rdet_swtyp_cd in ('1A','1B','1C','1E','1F','UG','UF','UJ') and
con_cntyp_cd = cntyp_cd
group by cntyp_descr,
    con_size_descr,
    substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) ,
    con_pwtyp_cd,
    con_locn_facil_id
;
spool off

```

TRU WASTE- VAL

Container Discription	Container Size	Pri	Uast	Date	Type	Facility	Count	Weight	Avg	Weight	Volume	Avg	Volume
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	3.8*4.3*12.5			1983 R		218U4C	1	2249.81		2249.81	5.78		5.78

				SUM			1	2249.81			5.78		
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	4.7*7.8*11			1982 R		218U4C	7	12531.34		1790.19	78.89		11.27

				SUM			7	12531.34			78.89		
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	4.7*7.8*11			1983 R		218U4C	4	7473.79		1868.45	45.08		11.27

				SUM			4	7473.79			45.08		
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1			1981 R		218U3A	4	7227.95		1806.99	46.78		11.70

				SUM			4	7227.95			46.78		
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1			1982 R		218U3A	3	5408.61		1802.87	35.09		11.70
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1			R		218U4C	7	12597.07		1771.01	81.87		11.70

				SUM			10	17805.68			116.95		
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1			1983 R		218U4C	2	3870.03		1955.02	23.39		11.70

				SUM			2	3870.03			23.39		
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.4 11.3			1982 R		218U4C	2	3900.88		1950.44	26.39		13.20

				SUM			2	3900.88			26.39		
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.4 11.3			1983 R		218U4C	1	1941.37		1941.37	13.20		13.20

				SUM			1	1941.37			13.20		
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6*6*6			1982 R		218U4C	7	11312.53		1616.08	47.20		6.74
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6.2*6.2*9			R		218U4C	4	7131.34		1782.84	34.43		8.61
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	9*10.67*16			R		218U4C	1	1983.10		1983.10	8.61		8.61

				SUM			12	20426.97			90.24		

TRU WASTE- VAL

Container Description	Container Size	Pri Last	Date	Type	Facility	Count	Weight	Avg Weight	Volume	Avg Volume
METAL DRUMS, BARRELS, KEGS	55 GALLON		1981	M	218UAC	52	7188.50	138.24	11.82	.21
METAL DRUMS, BARRELS, KEGS	55 GALLON			R	218UAC	24	3934.44	163.94	5.09	.21

			SUM			76	11122.94		16.11	
METAL DRUMS, BARRELS, KEGS	55 GALLON		1982	M	218UAC	34	3452.74	101.55	7.21	.21
METAL DRUMS, BARRELS, KEGS	55 GALLON			R	218UAC	40	5000.38	125.01	8.48	.21

			SUM			74	8453.12		15.69	

16 rows selected.

```

set linesize 170
set pagesize 44
set newpage 0
spool pot3.srep
title center 'TRU WASTE- VAL' -
right 'Page:' format 999 sql.pno skip 1
break on dt skip 1
compute sum of sum(con_gross_wgt) on dt
compute sum of sum(rdet_rswims_count) on dt
col dt                                format a4          heading "Date"
col con_pwtyp_cd                      format a4          heading "Pri|Wast|Type"
col rdet_swtyp_cd                     format a4          heading "Sec|Wast|Type"
col sum(con_gross_wgt)                format 999999.99    heading "Weight"
col sum(rdet_rswims_count)            format 99999      heading "Count"
col avg(con_gross_wgt)                format 999999.99    heading "Avg|Weight"
col sum(con_cntr_vol)                 format 99999.99    heading "Volume"
col avg(con_cntr_vol)                 format 99999.99    heading "Avg|Volume"
col cntyp_descr                       format a55        heading "Container Discription"
col con_size_descr                    format a45        heading "Container Size"
col con_locn_facil_id                 format a8         heading "Facility"
select
    cntyp_descr,
    con_size_descr,
    substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
    con_pwtyp_cd,
    con_locn_facil_id,
    sum(rdet_rswims_count),
    sum(con_gross_wgt),
    avg(con_gross_wgt),
    sum(con_cntr_vol),
    avg(con_cntr_vol)
from radwaste, cntype
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and rdet_swtyp_cd in ('1A','1B','1C','1E','1F','UC','UF','UJ') and ('4A') and
con_cntyp_cd = cntyp_cd
group by cntyp_descr,
    con_size_descr,
    substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) ,
    con_pwtyp_cd,
    con_locn_facil_id

spool off

```


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APPENDIX J.3

GE VALLECITOS NUCLEAR CENTER NON-TRU WASTE CONTAINERS

WHC-EP-0672

This subappendix provides information on VNC non-TRU waste containers, weight, volume and primary waste types disposed or stored at various facilities on the Hanford Site. The data provide the data from non-TRU waste generated by VNC by year.

```

set linesize 175
set pagesize 45
set newpage 0
spool pot3a.srep
title center 'NON-TRU WASTE- VAL' -
right 'Page:' format 999 sql.pno skip 1
break on dt skip 1
compute sum of sum(con_gross_wgt) on dt
compute sum of sum(rdet_rswims_count) on dt
col dt                                format a4          heading "Date"
col con_pwtyp_cd                      format a4          heading "Pri|Wast|Type"
col rdet_swtyp_cd                     format a4          heading "Sec|Wast|Type"
col sum(con_gross_wgt)                format 999999.99     heading "Weight"
col sum(rdet_rswims_count)            format 99999         heading "Count"
col avg(con_gross_wgt)                format 999999.99     heading "Avg|Weight"
col sum(con_cntr_vol)                 format 99999.99       heading "Volume"
col avg(con_cntr_vol)                 format 99999.99       heading "Avg|Volume"
col cntyp_descr                       format a55         heading "Container Discription"
col con_size_descr                    format a45          heading "Container Size"
col con_locn_facil_id                 format a8          heading "Facility"
col rdet_swtyp_cd                     format a4          heading "Sec|Wast|Code"
select
    cntyp_descr,
    con_size_descr,
    substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
    con_pwtyp_cd,
    rdet_swtyp_cd,
    con_locn_facil_id,
    sum(rdet_rswims_count),
    sum(con_gross_wgt),
    avg(con_gross_wgt),
    sum(con_cntr_vol),
    avg(con_cntr_vol)
from radwaste, contype
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and rdet_swtyp_cd in ('2A','2B','2L','3A','3L','UA','UB') and
con_cntyp_cd = cntyp_cd
group by cntyp_descr,
    con_size_descr,
    substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) ,
    con_pwtyp_cd,
    rdet_swtyp_cd,
    con_locn_facil_id
;
spool off

```

NON-TRU WASTE- VAL

Container Discription	Container Size	Pri Sec		Date	Type	Code	Facility	Count	Avg		Avg	
		Wast	Sec						Weight	Volume	Weight	Volume
METAL DRUMS, BARRELS, KEGS	55 GALLON			1981	R	2A	218U3A	8	884.05	1.70	884.05	1.70

		SUM						8	884.05	1.70		
METAL DRUMS, BARRELS, KEGS	55 GALLON			1982	H	2A	218U3A	8	1032.37	1.70	516.19	.85
WOODEN BOXES, CARTONS, CASES	3*3*4	R	2A				218U3A	1	222.26	1.06	222.26	1.06
WOODEN BOXES, CARTONS, CASES	3*5.6*6	R	3A				218U3AE	1	1305.43	2.95	1305.43	2.95
WOODEN BOXES, CARTONS, CASES	4*4*4	R	3A				218U3AE	1	815.55	1.84	815.55	1.84
WOODEN BOXES, CARTONS, CASES	4*4*5	R	3A				218U3AE	1	640.02	2.41	640.02	2.41

		SUM						12	4015.63	9.95		
WOODEN BOXES, CARTONS, CASES	4*4*8			1981	R	3A	218U3AE	5	2962.85	15.86	2962.85	15.86

		SUM						5	2962.85	15.86		
WOODEN BOXES, CARTONS, CASES	4*4*8			1982	R	2A	218U3A	2	1206.55	6.34	603.28	3.17
WOODEN BOXES, CARTONS, CASES	4*4*8	R	3A				218U3AE	8	6749.42	25.37	6749.42	25.37
WOODEN BOXES, CARTONS, CASES	4*6*8	R	3A				218U3AE	1	2396.77	5.41	2396.77	5.41
WOODEN BOXES, CARTONS, CASES	4*8*10	R	3A				218U3AE	1	2016.21	8.69	2016.21	8.69
WOODEN BOXES, CARTONS, CASES	5*6*10	R	3A				218U3AE	1	2834.94	8.47	2834.94	8.47
WOODEN BOXES, CARTONS, CASES	6*6*10	R	2A				218U3A	1	1832.50	10.39	1832.50	10.39

		SUM						14	17036.39	64.68		
WOODEN BOXES, CARTONS, CASES	6*8*9			1981	R	3A	218U3AE	2	4370.34	23.39	4370.34	23.39

		SUM						2	4370.34	23.39		

14 rows selected.

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APPENDIX J.4

RADIOLOGICAL DATA FOR TRU WASTE CONTAINERS

This subappendix summarizes the radiological data for all TRU waste containers generated at VNC between 1974 and 1983. Specifically, this computer run provides the total grams of TRU elements in a given container type in a given year. In addition, the average gram loading for a given container type in a given year has been calculated.

In 1991 and 1992 the number of curies (Ci) of alpha radiation was included on the SWBR's. These data are included in this run. This "Max Dose" column contains the highest value recorded for a given container in a given year, in mrem/h.

Radiological data for waste generated in 1974 is found in a separate SWITS run that follows the data for waste generated between 1981 and 1983.

```

set linesize 170
set pagesize 44
set newpage 0
spool pot4.srep
tttitle center 'TRU Waste VAL' -
right 'Page:' format 999 sql.pno skip 1
break on dt skip 1
compute sum of sum(rdet_rswims_count) on dt
compute sum of sum(rdet_rswims_count) on report
compute sum of sum(rad_qty) on dt
compute sum of avg(rad_qty) on dt
compute sum of sum(rad_alpha_ci) on dt
compute sum of avg(rad_alpha_ci) on dt
compute sum of max(rdet_bg_dose_rate) on dt
col dt                format a4                heading "Date"
col cntyp_descr       format a45                heading "Container Description"
col con_size_descr    format a20                heading "Container Size"
col con_pwtyp_cd      format a4                heading "Pri|Wast|Type"
col con_locn_facil_id format a8                heading "Location"
col sum(rdet_rswims_count) format 999999        heading "Count"
col sum(rad_qty)       format 999999.99        heading "Total|TRU (g)"
col avg(rad_qty)       format 99999.99         heading "Avg|TRU (g)"
col sum(rad_alpha_ci)  format 999999.99        heading "Total|Alpha (ci)"
col avg(rad_alpha_ci)  format 999999.99        heading "Avg|Alpha (ci)"
col max(rdet_bg_dose_rate) format 999999.99    heading "Max|Alpha (ci)"
select cntyp_descr,
       con_size_descr,
       substr(to_char(con_tsd_accept_dt, 'YYYY'),1, 4)dt,
       con_pwtyp_cd,
       con_locn_facil_id,
       sum(rdet_rswims_count),
       sum(rad_qty),
       avg(rad_qty),
       sum(rad_alpha_ci),
       avg(rad_alpha_ci),
       max(rdet_bg_dose_rate)
from radwaste, cntype, isoqty
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL' and
rad_iso_num in (1,21,22,26,41,52,87,97,98,100,104,105,111,146,147) and
rdet_swtyp_cd in ('1A','1B','1C','1D','1E','1F','UF','UG','UJ') and
con_cntyp_cd = cntyp_cd(+) and con_pkg_id = rad_pkg_id(+)
group by cntyp_descr,
       con_size_descr,
       con_pwtyp_cd,
       substr(to_char(con_tsd_accept_dt, 'YYYY'), 1, 4),
       con_locn_facil_id
;
spool off
tttitle off

```


TRU Waste VAL										
Container Description	Container Size	Date	Type	Location	Count	Total		Avg		Max
						TRU (g)	Alpha (ci)	TRU (g)	Alpha (ci)	
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	3.8*4.3*12.5	1983 R	218W4C	1	.33	.33				.50

		SUM		1	.33	.33	.00	.00	.00	.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	4.7*7.8*11	1982 R	218W4C	7	.30	.04				.50

		SUM		7	.30	.04	.00	.00	.00	.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	4.7*7.8*11	1983 R	218W4C	4	.31	.08				.50

		SUM		4	.31	.08	.00	.00	.00	.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1	1981 R	218W3A	4	.30	.08				.50

		SUM		4	.30	.08	.00	.00	.00	.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1	1982 R	218W3A	3	.07	.02				.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1	R	218W4C	7	.10	.01				.50

		SUM		10	.18	.04	.00	.00	.00	1.00
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1	1983 R	218W4C	2	.08	.04				.50

		SUM		2	.08	.04	.00	.00	.00	.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.4 11.3	1982 R	218W4C	2	.06	.03				.50

		SUM		2	.06	.03	.00	.00	.00	.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.4 11.3	1983 R	218W4C	1	.07	.07				.50

		SUM		1	.07	.07	.00	.00	.00	.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6*6*6	1982 R	218W4C	7	.87	.12				.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6.2*6.2*9	R	218W4C	4	1.17	.29				.50
FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	9*10.67*16	R	218W4C	1	.01	.01				.50

		SUM		12	2.05	.43	.00	.00	.00	1.50

TRU Waste VAL										
Container Description	Container Size	Date	Type	Location	Count	Total		Avg		Max
						TRU (g)	Alpha (ci)	TRU (g)	Alpha (ci)	
METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	218U4C		52	147.47	2.84			1.00

		SUM			52	147.47	2.84	.00	.00	1.00
METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	218U4C		34	53.28	1.57			1.00

		SUM			34	53.28	1.57	.00	.00	1.00
METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	218U4C		24	57.36	2.39			1.00

		SUM			24	57.36	2.39	.00	.00	1.00
METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	218U4C		40	242.80	6.07			1.00

		SUM			40	242.80	6.07	.00	.00	1.00

16 rows selected.

```

set linesize 170
set pagesize 44
set newpage 0
spool pot4.srep
tttitle center 'TRU Waste VAL' -
right 'Page:' format 999 sql.pno skip 1
break on dt skip 1
compute sum of sum(rdet_rswims_count) on dt
compute sum of sum(rdet_rswims_count) on report
compute sum of sum(rad_qty) on dt
compute sum of avg(rad_qty) on dt
compute sum of sum(rad_alpha_ci) on dt
compute sum of avg(rad_alpha_ci) on dt
compute sum of max(rdet_bg_dose_rate) on dt
col dt format a4 heading "Date"
col cntyp_descr format a45 heading "Container Description"
col con_size_descr format a20 heading "Container Size"
col con_pwtyp_cd format a4 heading "Pri|Wast|Type"
col con_locn_facil_id format a8 heading "Location"
col sum(rdet_rswims_count) format 999999 heading "Count"
col sum(rad_qty) format 999999.99 heading "Total|TRU (g)"
col avg(rad_qty) format 99999.99 heading "Avg|TRU (g)"
col sum(rad_alpha_ci) format 999999.99 heading "Total|Alpha (ci)"
col avg(rad_alpha_ci) format 999999.99 heading "Avg|Alpha (ci)"
col max(rdet_bg_dose_rate) format 999999.99 heading "Max|Alpha (ci)"
select cntyp_descr,
       con_size_descr,
       substr(to_char(con_tsd_accept_dt, 'YYYY'),1, 4)dt,
       con_pwtyp_cd,
       con_locn_facil_id,
       sum(rdet_rswims_count),
       sum(rad_qty),
       avg(rad_qty),
       sum(rad_alpha_ci),
       avg(rad_alpha_ci),
       max(rdet_bg_dose_rate)
from radwaste, contype, isoqty
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL' and
rad_iso_num in (1,21,22,26,41,52,87,97,98,100,104,105,111,146,147) and
rdet_swtyp_cd in ('1A','1B','1C','1D','1E','1F','1G','1H','1J','1K','1L','1M','1N','1O','1P','1Q','1R','1S','1T','1U','1V','1W','1X','1Y','1Z') and ('4A')
con_cntyp_cd = cntyp_cd(+) and con_pkg_id = rad_pkg_id(+)
group by cntyp_descr,
       con_size_descr,
       con_pwtyp_cd,
       substr(to_char(con_tsd_accept_dt, 'YYYY'), 1, 4),
       con_locn_facil_id
;
spool off
tttitle off

```

~~TRU Waste~~ GF UAH

Container Description	Container Size	Date	Type	Location	Count	Total		Avg		Total	Avg		Max
						TRU (g)	(g)	TRU (g)	(g)	Alpha (ci)	Alpha (ci)	Alpha (ci)	Alpha (ci)
CONCRETE BOXES	121 CU FT	1974 R	R	218U3A	4	247.45	61.86					30.00	
CONCRETE BOXES	5.5*5.5*6.3	R	R	218U3A	18	4456.01	247.56					600.00	

		SUM			22	4703.46	309.42			.00		630.00	

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APPENDIX J.5

**PHYSICAL CONTENTS DESCRIPTION FOR GE VALLECITOS
55-GALLON TRU WASTE DRUMS**

This subappendix describes the physical contents of the 55-gal drums of TRU waste generated at VNC. Before 1978, physical contents were not required on the burial records, so a great many of the early records list the contents of the drum as "miscellaneous."

The printout for this computer run sorts the contents data by storage facility, date, and primary waste type. The introduction to Appendix G contains a table of waste codes and their meanings.

```

set linesize 170
set pagesize 45
set newpage 0
spool pot5.srep
title center 'TRU WASTE-BABEX' VAL
right 'Page:' format 999 sql.pno skip 1
break on con_locn_facil_id skip 1
col phys_comp_descr          format a40          heading "Physical Description"
col cntyp_descr              format a55          heading "Container Discription"
col con_size_descr           format a45          heading "Container Size"
col dt                       format a4          heading "Date"
col con_pwtyp_cd             format a4          heading "Pri|Wast|Type"
col con_locn_facil_id        format a8          heading "Facility"
col sum(rdet_rswims_count)    format 999999      heading "Count"
compute sum of sum(rdet_rswims_count) on con_locn_facil_id
select phys_comp_descr,
       cntyp_descr,
       con_size_descr,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
       con_pwtyp_cd,
       con_locn_facil_id,
       sum(rdet_rswims_count)
from radwaste, contype, physcomp
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = BABEX' VAL'
and con_size_descr = '55 GALLON'
and rdet_swtyp_cd in ('1A','1B','1C','1E','1F','UG','UF','UJ') and
con_cntyp_cd = cntyp_cd and con_pkg_id = phys_pkg_id
group by con_locn_facil_id,
phys_comp_descr,
con_pwtyp_cd,
substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4),
cntyp_descr,
con_size_descr
;
spool off

```


Physical Description	Container Description	Container Size	Waste	
			Date	Type Facility Count
ALUMINUM	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	218MAC 5
ALUMINUM	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	1
ALUMINUM	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	23
ALUMINUM	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	4
AMTIFREEZE	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	31
CARBOLUNDUM	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	3
CARBOLUNDUM	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	18
CEMENT	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	1
CEMENT	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	6
CERAMICS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	1
CERAMICS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	4
CONCRETE	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	4
CONCRETE	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	18
COPPER METAL	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	5
COPPER METAL	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	1
COPPER METAL	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	23
COPPER METAL	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	4
COTTON/KOTEX	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	46
COTTON/KOTEX	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	33
COTTON/KOTEX	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	1
COTTON/KOTEX	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	33
DIRT/SOIL/DIATOMACEOUS EARTH	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	4
DIRT/SOIL/DIATOMACEOUS EARTH	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	23
DIRT/SOIL/DIATOMACEOUS EARTH	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	2
GLASS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	6
GLASS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	1
GLASS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	23
GLASS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	4
INSULATION NON-ASBESTOS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	4
INSULATION NON-ASBESTOS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	18
MARBLE	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	1
METAL/IRON/GALVANIZED/SHEET	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	6
METAL/IRON/GALVANIZED/SHEET	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	1
METAL/IRON/GALVANIZED/SHEET	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	23
METAL/IRON/GALVANIZED/SHEET	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	4
MISCELLANEOUS/UNKNOW/OTHER	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	32
MISCELLANEOUS/UNKNOW/OTHER	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 M	9
MISCELLANEOUS/UNKNOW/OTHER	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982 R	33
MOLYBDEUM	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 M	6
MOLYBDEUM	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981 R	23

TRU WASTE- VAL

Physical Description	Container Description	Container Size	Date	Type	Facility	Count
OILS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	M	218W4C	46
OILS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	M		33
OILS	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	R		1
PAINTS/LUCITE	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	M		24
PAPER/CARDBOARD	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	M		40
PAPER/CARDBOARD	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	M		33
PAPER/CARDBOARD	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	R		1
PAPER/CARDBOARD	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	R		34
PLASTIC/POLYURATHANE	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	M		46
PLASTIC/POLYURATHANE	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	M		33
PLASTIC/POLYURATHANE	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	R		1
PLASTIC/POLYURATHANE	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	R		34
RUBBER	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	M		15
RUBBER	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	M		24
RUBBER	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	R		1
RUBBER	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	R		1
SAND	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	M		1
SAND	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	R		4
STAINLESS STEEL	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	M		5
STAINLESS STEEL	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	M		1
STAINLESS STEEL	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	R		23
STAINLESS STEEL	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	R		4
WOOD/LUMBER/PLYWOOD	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	M		46
WOOD/LUMBER/PLYWOOD	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	M		33
WOOD/LUMBER/PLYWOOD	METAL DRUMS, BARRELS, KEGS	55 GALLON	1981	R		1
WOOD/LUMBER/PLYWOOD	METAL DRUMS, BARRELS, KEGS	55 GALLON	1982	R		34
*****						1015
SUM						1015

66 rows selected.

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APPENDIX J.6

**PHYSICAL CONTENTS DESCRIPTION FOR GE VALLECITOS NUCLEAR CENTER
TRU WASTE CONTAINER OTHER THAN 55-GALLON DRUMS**

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This subappendix described the physical contents of the TRU waste containers other than 55-gal drums generated at VNC. Note that before 1978 physical contents were not required on the burial records, so a great many of the early records list the contents for a container as "miscellaneous."

The printout for this computer run sorts the contents data by storage facility, data, and primary waste type. The introduction to Appendix G contains a table of waste codes and their meanings.

```

set linesize 170
set pagesize 45
set newpage 0
spool pot6.srep
tttitle center 'TRU WASTE - VAL' -
right 'Page:' format 999 sql.pno skip 1
break on con_locn_facil_id skip 1
col phys_comp_descr          format a40          heading "Physical Description"
col con_size_descr          format a47          heading "Container Description"
col cntyp_descr             format a45          heading "Container Size"
col dt                      format a4           heading "Date"
col con_pwtyp_cd            format a4           heading "Pri|Wast|Type"
col con_locn_facil_id       format a8           heading "Facility"
col sum(rdet_rswims_count)   format 999999      heading "Count"
col rdet_swtyp_cd           format a4           heading "Sec|Wast|Type"
compute sum of sum(rdet_rswims_count) on con_locn_facil_id
select phys_comp_descr,
       cntyp_descr,
       con_size_descr,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
       con_pwtyp_cd,
       rdet_swtyp_cd,
       con_locn_facil_id,
       sum(rdet_rswims_count)
from radwaste, contype, physcomp
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and con_size_descr <> '55 GALLON'
and rdet_swtyp_cd in ('1A','1B','1C','1E','1F','UG','UF','UJ') and
con_cntyp_cd = cntyp_cd and con_pkg_id = phys_pkg_id
group by con_locn_facil_id,
phys_comp_descr,
con_pwtyp_cd,
rdet_swtyp_cd,
substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4),
cntyp_descr,
con_size_descr
;
spool off

```

TRU WASTE - VAL

Physical Description	Container Size	Container Description	Wast		Date	Type	Facility	Count
			Pri	Sec				
METAL/IRON/GALVANIZED/SHEET	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1	1981	R	1A	218USA	4	
METAL/IRON/GALVANIZED/SHEET	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1	1982	R	1A	*****	3	
						SUM	7	
FOAM/STYROFOAM	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6*6*6	1982	R	1A	218MAC	7	
FOAM/STYROFOAM	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6.2*6.2*9	1982	R	1A		4	
FOAM/STYROFOAM	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	9*10.67*16	1982	R	1A		1	
FOAM/STYROFOAM	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	3.8*4.3*12.5	1983	R	1A		1	
METAL/IRON/GALVANIZED/SHEET	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	3.8*4.3*12.5	1983	R	1A		1	
METAL/IRON/GALVANIZED/SHEET	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	4.7*7.8*11	1983	R	1A		4	
METAL/IRON/GALVANIZED/SHEET	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1	1983	R	1A		2	
METAL/IRON/GALVANIZED/SHEET	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.4 11.3	1983	R	1A		1	
PLASTIC/POLYURATHANE	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.4 11.3	1982	R	1A		1	
PLASTIC/POLYURATHANE	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6*6*6	1982	R	1A		2	
PLASTIC/POLYURATHANE	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6.2*6.2*9	1982	R	1A		3	
WOOD/LUMBER/PLYWOOD	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	4.7*7.8*11	1982	R	1A		7	
WOOD/LUMBER/PLYWOOD	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.3*10.1	1982	R	1A		7	
WOOD/LUMBER/PLYWOOD	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	5.6*7.4 11.3	1982	R	1A		2	
WOOD/LUMBER/PLYWOOD	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6*6*6	1982	R	1A		7	
WOOD/LUMBER/PLYWOOD	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	6.2*6.2*9	1982	R	1A		4	
WOOD/LUMBER/PLYWOOD	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	9*10.67*16	1982	R	1A	*****	1	
						SUM	55	

19 rows selected.

WHC-EP-0672

APPENDIX J.7

**HAZARDOUS CONSTITUENTS OF 55-GALLON DRUMS
CONTAINING TRU WASTE**

The presence of hazardous constituents in a radioactive waste drums designates the waste as "mixed" (primary waste code "M"). In this subappendix, the hazardous contents of 55-gal drums generated at VNC are sorted by storage facility and year.

Information concerning the hazardous constituents of waste containers was not required before 1986. During the R-SWIMS data re-entry program in the mid-1980's an attempt was made to add any available information on the hazardous materials present, however, this information was limited.

```

set linesize 170
set pagesize 45
set newpage 0
spool pot7.srep
tttitle center 'TRU Waste VAL' -
right 'Page:' format 999 sql.pno skip 1
break on con_locn_facil_id skip 1
col haz_comp_text          format a40          heading "Hazardous"
col con_size_descr         format a45          heading "Container Description"
col cntyp_descr            format a40          heading "Container Size"
col dt                     format a4           heading "Date"
col con_pwtyp_cd           format a4           heading "Pri|Wast|Type"
col con_locn_facil_id      format a8           heading "Facility"
col sum(rdet_rswims_count) format 999999      heading "Count"
compute sum of sum(rdet_rswims_count) on con_locn_facil_id
select haz_comp_text,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
       cntyp_descr,
       con_size_descr,
       con_pwtyp_cd,
       con_locn_facil_id,
       sum(rdet_rswims_count)
from radwaste, contype, chemcomp
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and con_size_descr = '55 GALLON'
and rdet_swtyp_cd in ('1A','1B','1C','1E','1F','UG','UF','UJ') and
con_cntyp_cd = cntyp_cd and con_pkg_id = haz_pkg_id
group by con_locn_facil_id,
haz_comp_text,
con_pwtyp_cd,
substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4),
       cntyp_descr,
       con_size_descr
;
spool off

```

TRU Waste VAL

Hazardous	Date	Container Size	Container Description	Pri	
				Waste	Type
				Facility	Count
ANTIFREEZE	1981 METAL DRUMS, BARRELS, KEGS	55 GALLON	M	218W4C	30
COPPER	1981 METAL DRUMS, BARRELS, KEGS	55 GALLON	M		6
COPPER	1982 METAL DRUMS, BARRELS, KEGS	55 GALLON	M		1
OIL	1981 METAL DRUMS, BARRELS, KEGS	55 GALLON	M		46
OIL	1982 METAL DRUMS, BARRELS, KEGS	55 GALLON	M		33
OIL	1981 METAL DRUMS, BARRELS, KEGS	55 GALLON	R	*****	1
			SUM		117

6 rows selected.

WHC-EP-0672

APPENDIX J.8

**HAZARDOUS CONSTITUENTS OF TRU WASTE CONTAINERS
OTHER THAN 55-GALLON DRUMS**

WHC-EP-0672

The presence of hazardous constituents in a radioactive waste container designates the waste as "mixed" (primary waste code "M"). In this subappendix, the hazardous contents of containers other than 55-gal drums generated at VNC are sorted by storage facility and year.

Information concerning the hazardous constituents of waste containers was not required before 1986. During the R-SWIMS data re-entry program in the mid-1980's an attempt was made to add any available information on the hazardous materials present, however, this information was limited.

```

set linesize 170
set pagesize 45
set newpage 0
spool pot8.srep
title center 'TRU Waste VAL' -
right 'Page:' format 999 sql.pno skip 1
break on con_locn_facil_id skip 1
col haz_comp_text          format a40          heading "Hazardous"
col con_size_descr         format a45          heading "Container Description"
col cntyp_descr            format a40          heading "Container Size"
col dt                     format a4           heading "Date"
col con_pwtyp_cd           format a4           heading "Pri|Wast|Type"
col con_locn_facil_id      format a8           heading "Facility"
col sum(rdet_rswims_count) format 999999      heading "Count"
select haz_comp_text,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
       cntyp_descr,
       con_size_descr,
       con_pwtyp_cd,
       con_locn_facil_id,
       rdet_rswims_count
from radwaste, contype, chemcomp
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and con_size_descr <> '55 GALLON'
and rdet_swtyp_cd in ('1A','1B','1C','1E','1F','UG','UF','UJ') and
con_cntyp_cd = cntyp_cd and con_pkg_id = haz_pkg_id
group by con_locn_facil_id,
haz_comp_text,
con_pwtyp_cd,
       cntyp_descr,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4),
       con_size_descr,
       rdet_rswims_count
;
spool off

```

```

col con_locn_facil_id          format a8          heading "Facility"
col sum(rdet_rswims_count)     format 999999      heading "Count"
select haz_comp_text,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
       cntyp_descr,
       con_size_descr,
       con_pwtyp_cd,
       con_locn_facil_id,
       rdet_rswims_count
from radwaste, contype, chemcomp
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_cmpny_id = 'GE' and
con_srce_facil_id = 'VAL'
and con_size_descr <> '55 GALLON'
and rdet_swtyp_cd in ('1A','1B','1C','1D','1E','1F','UG','UF','UJ') and
con_cntyp_cd = cntyp_cd and con_pkg_id = haz_pkg_id
group by con_locn_facil_id,
"pot8.sql" 37 lines, 1183 characters

```

SQL> @pot8

no rows selected

SQL>

. . .

'VT220' 80 COL' '7 BIT MODE'

4 of 4

APPENDIX J.9

**ISOTOPES LISTED IN 55-GALLON DRUMS
CONTAINING TRU WASTES**

This subappendix contains a listing of the SWITS isotopes information for TRU waste from VNC stored in 55-gal drums. The isotope field in SWITS contains several types of information.

- Specific isotope (e.g., ^{241}Am , ^{237}Np , ^{233}U , ^{239}Pu)
- Generic isotope listings (e.g., plutonium, uranium-enriched, uranium-depleted)
- ^{239}Pu fissile gram equivalents (Pu 239 FSL GR equivalent)
- Total - alpha
- Total Beta/Gamma
- PE-Ci (Plutonium Equivalent Curies)

This computer run contains the isotope field listing along with the number of TRU waste drums with that listing. The run is sorted by storage facility and year.

```

set linesize 170
set pagesize 45
set newpage 0
spool pot9.srep
tttitle center 'TRU Waste VAL' -
right 'Page:' format 999 sql.pno skip 1
break on dt skip 1
compute sum of sum(rad_qty) on con_locn_facil_id
compute sum of sum(rdet_rswims_count) on con_locn_facil_id
col iso_name          format a30          heading "Isotope"
col sum(rad_qty)      format 999999.999999 heading "Rad Qty"
col iso_unit          heading a4          heading "Unit"
col dt               format a4           heading "Date"
col cntyp_descr       format a40         heading "Container Size"
col con_size_descr    format a45         heading "Container Description"
col con_pwtyp_cd      format a4         heading "Pri|Wast|Type"
col con_locn_facil_id format a8         heading "Facility"
col sum(rdet_rswims_count) format 999999 heading "Count"
select iso_name,
       sum(rad_qty),
       iso_unit,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
       cntyp_descr,
       con_size_descr,
       con_pwtyp_cd,
       rdet_swtyp_cd,
       con_locn_facil_id,
       sum(rdet_rswims_count)
from radwaste, contype, isotope, isoqty
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and con_size_descr = '55 GALLON'
and rdet_swtyp_cd in ('1A','1B','1C','1E','1F','UG','UF','UJ') and
con_cntyp_cd = cntyp_cd and con_pkg_id = rad_pkg_id and rad_iso_num = iso_num
group by iso_name,
       iso_unit,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4),
       con_pwtyp_cd,
       rdet_swtyp_cd,
       con_locn_facil_id,
       cntyp_descr,
       con_size_descr,
       rdet_rswims_count
;
spool off

```

TRU Waste VAL

Isotope	Rad Qty Un Date Container Size			Container Description	Pri Sec		Count
					Waste Type	Facility	
PU	147.470000	GH 1981	METAL DRUMS, BARRELS, KEGS	55 GALLON	M 1A	218U4C	52
PU	57.360000	GH	METAL DRUMS, BARRELS, KEGS	55 GALLON	R 1A	218U4C	24
	-----	----					-----
	204.830000	SUM					76
PU	53.280000	GH 1982	METAL DRUMS, BARRELS, KEGS	55 GALLON	M 1A	218U4C	34
PU	242.800200	GH	METAL DRUMS, BARRELS, KEGS	55 GALLON	R 1A	218U4C	40
	-----	----					-----
	296.080200	SUM					74
TOTAL BETA/GAMMA	.520000	CI 1981	METAL DRUMS, BARRELS, KEGS	55 GALLON	M 1A	218U4C	52
TOTAL BETA/GAMMA	.240000	CI	METAL DRUMS, BARRELS, KEGS	55 GALLON	R 1A	218U4C	24
	-----	----					-----
	.760000	SUM					76
TOTAL BETA/GAMMA	.326000	CI 1982	METAL DRUMS, BARRELS, KEGS	55 GALLON	M 1A	218U4C	34
TOTAL BETA/GAMMA	.207000	CI	METAL DRUMS, BARRELS, KEGS	55 GALLON	R 1A	218U4C	40
	-----	----					-----
	.533000	SUM					74
URANIUM-NATURAL	18409.570000	GH 1981	METAL DRUMS, BARRELS, KEGS	55 GALLON	M 1A	218U4C	51
URANIUM-NATURAL	111.300000	GH	METAL DRUMS, BARRELS, KEGS	55 GALLON	R 1A	218U4C	21
	-----	----					-----
	18520.870000	SUM					72
URANIUM-NATURAL	74673.470000	GH 1982	METAL DRUMS, BARRELS, KEGS	55 GALLON	M 1A	218U4C	10
URANIUM-NATURAL	66460.230000	GH	METAL DRUMS, BARRELS, KEGS	55 GALLON	R 1A	218U4C	34
	-----	----					-----
	141133.700000	SUM					44

12 rows selected.

APPENDIX J.10

**ISOTOPES LISTED IN TRU CONTAINERS
OTHER THAN 55-GALLON DRUMS**

This subappendix contains a listing of the SWITS isotopes information for TRU waste from VNC stored containers other than 55-gal drums. The isotope field in SWITS contains several types of information.

- Specific isotope (e.g., ^{241}Am , ^{237}Np , ^{233}U , ^{238}Pu)
- Generic isotope listings (e.g., plutonium, uranium-enriched, uranium-depleted)
- ^{239}Pu fissile gram equivalents (Pu 239 FSL GR equivalent)
- Total - alpha
- Total Beta/Gamma
- PE-Ci (Plutonium Equivalent Curies)

This computer run contains the isotope field listing along with the number of TRU waste drums with that listing. The run is sorted by storage facility and year.

The isotopic data for waste generated in 1974 appear in a separate SWITS run that follows the data for waste generated between 1981 and 1983.

```

set linesize 170
set pagesize 45
set newpage 0
spool pot10.srep
title center 'TRU Waste VAL' -
right 'Page:' format 999 sql.pno skip 1
break on dt skip 1
compute sum of sum(rad_qty) on con_locn_facil_id
compute sum of sum(rdet_rswims_count) on con_locn_facil_id
col iso_name          format a30          heading "Isotope"
col sum(rad_qty)      format 9999.999999 heading "Rad Qty"
col iso_unit          heading a4          heading "Unit"
col dt                format a4          heading "Date"
col cntyp_descr       format a45          heading "Container Size"
col con_size_descr    format a45          heading "Container Description"
col con_pwtyp_cd      format a4          heading "Pri|Wast|Type"
col con_locn_facil_id format a8          heading "Facility"
col sum(rdet_rswims_count) format 999999 heading "Count"
select iso_name,
       sum(rad_qty),
       iso_unit,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
       cntyp_descr,
       con_size_descr,
       con_pwtyp_cd,
       con_locn_facil_id,
       sum(rdet_rswims_count)
from radwaste, contype, isotope, isogty
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and con_size_descr <> '55 GALLON'
and rdet_swtyp_cd in ('1A','1B','1C','1E','1F','UG','UF','UJ') and
con_cntyp_cd = cntyp_cd and con_pkg_id = rad_pkg_id and rad_iso_num = iso_num
group by iso_name,
       iso_unit,
       con_pwtyp_cd,
       con_locn_facil_id,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4),
       cntyp_descr,
       con_size_descr
;
spool off

```


TRU Waste VAL

Isotope	Rad Qty	Un Date	Container Size	Container Description	Type	Facility	Count
PU	.301000	GM	1981	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J3A	4
	-----	-----	----	-----	-----	-----	-----
	.301000	sum					4
PU	.074000	GM	1982	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J3A	3
PU	.302000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	7
PU	.103000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	7
PU	.058000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	2
PU	.868000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	7
PU	1.170000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	4
PU	.010000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	1
	-----	-----	----	-----	-----	-----	-----
	2.585000	sum					31
PU	.329000	GM	1983	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	1
PU	.313400	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	4
PU	.083000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	2
PU	.068000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	1
	-----	-----	----	-----	-----	-----	-----
	.793400	sum					8
TOTAL BETA/GAMMA	.380400	CI	1981	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J3A	4
	-----	-----	----	-----	-----	-----	-----
	.380400	sum					4
TOTAL BETA/GAMMA	.186000	CI	1982	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J3A	3
TOTAL BETA/GAMMA	.460000	CI		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	7
TOTAL BETA/GAMMA	.158000	CI		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	7
TOTAL BETA/GAMMA	.083000	CI		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	2
TOTAL BETA/GAMMA	1.477000	CI		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	7
TOTAL BETA/GAMMA	1.815300	CI		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	4
TOTAL BETA/GAMMA	.010000	CI		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	1
	-----	-----	----	-----	-----	-----	-----
	4.189300	sum					31
TOTAL BETA/GAMMA	.050000	CI	1983	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	1
TOTAL BETA/GAMMA	1.324500	CI		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	4
TOTAL BETA/GAMMA	.128800	CI		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	2
TOTAL BETA/GAMMA	.103400	CI		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218J4C	1
	-----	-----	----	-----	-----	-----	-----

TRU Waste VAL

Isotope	Rad Qty	Un Date	Container Size	Container Description	Type	Facility	Count
URANIUM-NATURAL	1.606700	sum					8
	.969000	GM	1981	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U3A	4
	-----	****					-----
	.969000	sum					4
URANIUM-NATURAL	.239000	GM	1982	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U3A	3
	.975000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	7
	.338000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	7
	.156000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	2
	4.851000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	7
	3.306000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	4
	.010000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	1
	-----	****					-----
	9.875000	sum					31
URANIUM-NATURAL	1.050000	GM	1983	FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	1
	1.010000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	4
	.269000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	2
	.218000	GM		FIBERGLASS REINFORCED PLYWOOD (FRP) BOXES	R	218U4C	1
	-----	****					-----
	2.547000	sum					8

36 rows selected.

```

set linesize 170
set pagesize 45
set newpage 0
spool pot10.srep
tttitle center 'TRU Waste VAL' -
right 'Page:' format 999 sql.pno skip 1
break on dt skip 1
compute sum of sum(rad_qty) on con_locn_facil_id
compute sum of sum(rdet_rswims_count) on con_locn_facil_id
col iso_name          format a30          heading "Isotope"
col sum(rad_qty)       format 9999.999999 heading "Rad Qty"
col iso_unit          heading a4          heading "Unit"
col dt                format a4          heading "Date"
col cntyp_descr        format a45        heading "Container Size"
col con_size_descr     format a45        heading "Container Description"
col con_pwtyp_cd       format a4         heading "Pri|Wast|Type"
col con_locn_facil_id  format a8         heading "Facility"
col sum(rdet_rswims_count) format 999999 heading "Count"
select iso_name,
       sum(rad_qty),
       iso_unit,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4) dt,
       cntyp_descr,
       con_size_descr,
       con_pwtyp_cd,
       con_locn_facil_id,
       sum(rdet_rswims_count)
from radwaste, contype, isotope, isoqty
where con_tsd_accept_dt between '01-jan-69' and '31-dec-92' and
con_srce_facil_id = 'VAL'
and con_size_descr <> '55 GALLON'
and rdet_swtyp_cd in ('1A','1B','1C','1E','1F','1G','1H','1J') and ('4A')
con_cntyp_cd = cntyp_cd and con_pkg_id = rad_pkg_id and rad_iso_num = iso_num
group by iso_name,
       iso_unit,
       con_pwtyp_cd,
       con_locn_facil_id,
       substr (to_char(con_tsd_accept_dt, 'YYYY'),1, 4),
       cntyp_descr,
       con_size_descr
;
spool off

```

TRU Waste ~~32574~~ GFUHL

Isotope	Rad Qty	Un Date	Container Size	Container Description	Pri	Waste Type	Facility	Count
CE-144 -- PR-144	11876.000000	CI	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
CE-144 -- PR-144	41112.100000	CI	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		18
CO-60	478.000000	CI	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
CO-60	1754.300000	CI	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		18
CS-137 -- BA-137M	3711.500000	CI	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
CS-137 -- BA-137M	13081.060000	CI	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		18
EU-155	38.100000	CI	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		4
KR-85	793.000000	CI	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
KR-85	2937.000000	CI	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		16
PH-147	8974.000000	CI	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
PH-147	31260.000000	CI	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		18
RU-106 -- RH-106	1108.000000	CI	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
RU-106 -- RH-106	4145.650000	CI	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		18
SR-90 - Y90	3695.000000	CI	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
SR-90 - Y90	12847.500000	CI	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		18
TOTAL BETA/GAMMA	52778.000000	CI	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
TOTAL BETA/GAMMA	184283.100000	CI	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		18
PU	247.450000	GM	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
PU	4456.010000	GM	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		18
URANIUM-DEPLETED	215.280000	GM	1974 CONCRETE BOXES	121 CU FT	R	218U3A		2
URANIUM-DEPLETED	17895.160000	GM	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		12
URANIUM-ENRICHED	3017.800000	GM	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
URANIUM-ENRICHED	17855.300000	GM	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		16
URANIUM-NATURAL	373.060000	GM	1974 CONCRETE BOXES	121 CU FT	R	218U3A		4
URANIUM-NATURAL	1130.580000	GM	1974 CONCRETE BOXES	5.5*5.5*6.3	R	218U3A		14

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