Savannah River Site Offsite Hazardous Waste Shipment Data Validation Report

**C. Casey
D. E. Kudara
L. A. Page
M. J. Rohe**

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**Idaho National Engineering Laboratory
Idaho Falls, Idaho 83415**

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ABSTRACT

The objective of this data validation is to verify that waste shipments reported in response to the U.S. Department of Energy Headquarters (DOE-HQ) data request are properly categorized according to DOE-HQ definitions. This report documents all findings and actions resulting from the independent review of the Savannah River Site (SRS) data submittal, and provides a summary of the SRS data submittal and data validation strategy. The overall hazardous waste management and offsite release process from 1987 through 1991 is documented, along with an identification and description of the hazardous waste generation facilities. SRS did not ship any hazardous waste offsite before 1987. Sampling and analysis and surface surveying procedures and techniques used in determining offsite releasability of the shipments are also described in this report. SRS reported 150 manifested waste shipments from 1984 to 1991 that included 4,755 drums or lab packs and 13 tankers. Of these waste items, this report categorizes 4,251 as clean (including 12 tankers), 326 as likely clean, 138 as likely radioactive, and 55 as radioactive (including one tanker). Although outside the original scope of this report, 14 manifests from 1992 and 1993 are included, covering 393 drums or lab packs and seven tankers. From the 1992-1993 shipments, 58 drums or lab packs are categorized as radioactive and 16 drums are categorized as likely radioactive. The remainder are categorized as clean.

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ACRONYMS

CFR	Code of Federal Regulations
CWM	chemical waste management
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy Headquarters
DOT	Department of Transportation
EPA	Environmental Protection Agency
HPGe	high purity germanium
HPO	Health Protection Operations
HWSDS	Hazardous Waste Shipment Data System
HWSF	Hazardous Waste Storage Facility
LLD	lower limit of detection
LSC	liquid scintillation counting
MDA	minimum detectable activity
NRHW	nonradioactive hazardous waste
PAN	passive-active neutron
PCB	polychlorinated biphenyls
PHA	pulse height analysis
RCA	radiologically controlled area
RCRA	Resource Conservation and Recovery Act
RES	Rollins Environmental Services
RHYTHM	Remember How You Treat Hazardous Materials
RMMA	Radioactive Materials Management Area
SRS	Savannah River Site
SRTC	Savannah River Technology Center
T&T	Traffic and Transportation
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
TSP	Radioactive Waste Technical Support Program
WCF	Waste Characterization Form
WM	Waste Management

Savannah River Site Offsite Hazardous Waste Shipment Data Validation Report

1. INTRODUCTION

1.1 Background

On May 17, 1991, the Environmental Restoration and Waste Management Office of Waste Operations (EM-30) directed the field to cease shipments of Resource Conservation and Recovery Act (RCRA) hazardous waste and Toxic Substances Control Act (TSCA) regulated waste that came from radiological control areas (RCAs). U.S. Department of Energy Headquarters (DOE-HQ) decided to halt shipments because of instances of sites using differing and sometimes inappropriate criteria to decide whether a waste was suitable for offsite release. The hold on shipments continues until DOE-HQ reviews and approves the criteria and methods for offsite release for each site.

DOE-HQ also requested specific information from DOE sites to help resolve the hazardous waste issue. A memorandum from Leo P. Duffy^a (called the *data request* in this report) asked the sites to give DOE-HQ detailed information about 1984–1991 offsite shipments of hazardous waste by September 30, 1991. The data request asked the sites to categorize the waste shipments using the guidance provided in the memorandum.

The Radioactive Waste Technical Support Program (TSP) has been supporting the DOE-HQ Regulatory Integration Division (EM-331) in the collection, quality review, electronic storage, and reporting of the shipment data. TSP developed the Hazardous Waste Shipment Data System (HWSDS) to store and report the data. TSP received data from the 35 sites that DOE-HQ requested to respond to the data request. Most recently, EM-331 has requested TSP to focus on further validation of the shipment data received from specific selected sites.

1.2 Purpose

The principal goal of this data validation is to determine if the sites correctly categorized the waste shipments reported in response to the DOE-HQ data request.

1.3 Data Validation Report Scope

This report documents all findings and actions resulting from the independent review of the Savannah River Site (SRS) data submittal. This report also includes a summary of the SRS data submittal and data validation strategy. The overall hazardous waste management and offsite release process used from 1987 through 1991 is documented, along with an identification and description of the hazardous

a. Memorandum from Leo P. Duffy to DOE sites, "Data Requirements on Past Shipments of Hazardous/Toxic Wastes Potentially Contaminated with Radioactivity," August 26, 1991.

waste generation facilities. SRS did not ship any hazardous waste offsite before 1987. Sampling and analysis and surface surveying procedures and techniques used in determining if the shipments could be released offsite are also described in this report. The report includes information on shipments made in 1992 and 1993, supplied by SRS, because some shipments of hazardous waste contaminated with radioisotopes were made to nonlicensed commercial TSDFs during those years.

2. SRS DATA SUBMITTAL SUMMARY

The SRS data submittal reported 145 manifested waste shipments, covering 825,319.8 kg, over the 1987–1991 period. In the data submittal, SRS broke the manifests reported into subgroups of containers, sample composites, waste generator, and waste descriptions. This report calls these subgroupings waste items. The 145 manifests included 1,399 waste items. SRS categorized all of the waste items as either clean or likely clean. SRS categorized all waste shipments from within an RCA as likely clean and all waste shipments from outside an RCA as clean. One hundred and nine of the shipments included clean waste, and 45 included likely clean wastes. SRS categorized none of the shipments as known radioactive or likely radioactive.

SRS reported 10 final treatment, storage, and disposal (TSD) facilities that provided treatment or disposal of the waste. Table 1 contains the final/prime TSD facilities.

2.1 Decision Criteria and Activity Estimates

As part of the original data submittal, SRS reported that bulk decision criteria in effect during the reporting period were 2 nCi/g. Surface decision criteria were more stringent than limits in DOE Order 5400.5, "Radiation Protection of the Public and the Environment." SRS used these as validation criteria before shipping waste offsite. Personnel at the generating facility made an earlier determination that their operation added no radioactivity to the waste before the waste was sent to SRS Waste Management (WM). For most of the waste shipments, the SRS data submittal included total activity concentrations in nanocuries per gram from radiological sampling and analyses. TSP used these data to estimate activities for the waste.

The waste quantities on most manifests were broken down by container, composite number, generator, and waste description (or waste items). Because of this breakdown, many manifests repeated more than one waste description. The information submitted by SRS included total activity concentrations from radiological sampling and analyses for most subgroupings.

To reduce the total entries in the database, TSP combined like waste items and calculated a single weighted average for each unique waste description on each manifest. However, on some manifests, TSP found wide variations among the reported total activity concentrations. For these manifests, TSP calculated more than one weighted average for repeated waste descriptions. Each unique combination of that waste description and weighted average was reported separately in the HWSDS.

Table 1. Final/prime TSD facilities.^a

Company name	Location	EPA identification number
Alternate Energy Resources	Augusta, Georgia	GAD033582461
Capitol Silver Service	Gallatin, Tennessee	TND078221249
Chemical Waste Management	Chicago, Illinois	ILD00672121
Giant Resource Recovery	Harleyville, South Carolina	SCD003351699
M&M Chemical and Equipment	Attalla, Alabama	ALD070513767
Rollins Environmental Services	Baton Rouge, Louisiana	LAD010395127
Rollins Environmental Services	Bridgeport, New Jersey	NJD053288239
Rollins Environmental Services	Deer Park, Texas	TXD055141378
Ross Incineration Services	Grafton, Ohio	OHD048415665
Safety Kleen	New Castle, Kentucky	KYD053348108

a. This list does not include landfills used to dispose of incinerator ash or drums.

3. SRS DATA VALIDATION STRATEGY

TSP began an independent review of the SRS waste shipments on September 1–3, 1992, at SRS. During the presentation and interview-based meetings, Westinghouse Savannah River Company and DOE Savannah River Operations personnel explained past and current SRS hazardous waste management practices and procedures. The 1987–1991 shipment data were also discussed.

3.1 DOE-HQ Definitions

The principal goal of the independent review of SRS data is to determine whether SRS correctly categorized the shipments by DOE-HQ definitions for waste categories. The following sections give the DOE-HQ definitions found in the data request.

3.1.1 Waste Categories

The DOE-HQ data request defined four categories for the offsite waste shipments. These categories are:

- Known radioactive waste
- Clean waste
- Likely radioactive waste (also called highly suspect waste)
- Likely clean waste (also called questionable waste).

DOE-HQ defined the categories in the data request as follows.

Known Radioactive Waste. For known radioactive waste, sampling and analysis data show radioactivity *above background* (background includes natural levels of radiation in materials). Alternatively, data show that surface contamination exceeded the DOE Order 5400.5 guidelines.

Thus, sampling and analysis for this waste show that DOE operations added radioactivity to the volume or bulk of the waste, or survey results show that surface contamination levels exceed DOE Order 5400.5 guidelines. In either case, radioactivity is present above the known background.

Clean Waste. Clean waste comes from outside a radioactive materials management area (RMMA). For this waste, documented evidence of administrative controls, process knowledge, or sampling and analysis data show that radioactivity is not present in the waste bulk or volume above background. Data must also show that the surface contamination is less than DOE Order 5400.5 guidelines. Clean waste can come from within an RMMA if analytical data confirm that DOE has not added radioactivity above background to the waste.

Likely Radioactive Waste. Likely radioactive waste is waste that the site cannot categorize as known radioactive or clean waste. Documented evidence of administrative controls, process knowledge, or analytical data is not available to show that DOE operations did not add radioactivity to the waste bulk or volume. However, this waste is similar in form or type, or it comes from the same process or areas as a known radioactive waste.

Likely Clean Waste. Likely clean waste comes from within an RMMA, but the site cannot categorize the waste as known radioactive, likely radioactive, or clean waste. Documented evidence of administrative controls, process knowledge, or analytical data is not available to show that DOE operations did not add radioactivity to the waste bulk or volume. Also, no evidence shows that the surface contamination is less than DOE Order 5400.5 guidelines. This waste is not similar to any waste categorized as radioactive.

3.2 Categorization Process

Figure I presents a flow diagram of the process for categorizing the SRS shipment data. The decision tree is based on the definitions discussed above (Section 3.1).

3.3 Key Evaluation Elements

The following are the key evaluation elements completed in the independent review.

- Confirmation of the existence of manifests that correspond to the hazardous waste shipments reported
- Assessment of onsite hazardous waste management
- Identification of facilities and areas that generate hazardous waste
- Discussion of the past and current processes in place at hazardous waste generation facilities
- Discussion of administrative controls, survey techniques, sampling procedures, analysis methodologies, and hazardous waste management procedures used for the shipments
- Evaluation of documented analytical data for 1987–1991 hazardous waste shipments
- Discussion of bulk or volume and surface offsite release criteria used for the shipments
- Discussion of naturally occurring or background radiation, and how the laboratory analysis accounted for this radiation
- Discussions of the hazardous waste streams that the site has shipped offsite
- Reassignment of shipment categorizations.
- A brief discussion of waste shipments in 1992 and 1993, a few of which were found to contain small quantities of DOE-added radioactivity.

4. DATA VALIDATION RESULTS

4.1 Offsite Release Process

4.1.1 History

Offsite shipping of hazardous waste from SRS did not begin until the fourth quarter of calendar year 1987. Before this date, SRS-generated waste was disposed of onsite or placed in indefinite storage. SRS placed ordinary municipal-type waste in landfills and stored hazardous waste at various onsite locations. This storage or disposal included all waste streams at SRS, including recyclable materials such as aluminum beverage cans. No waste left the site except polychlorinated biphenyls (PCBs) that WM shipped offsite to maintain compliance with TSCA.

In the fourth quarter of 1987, SRS began offsite shipments of hazardous waste to comply with the land disposal restrictions of RCRA. The M-Area and WM facilities made separate shipments. In 1988, WM assumed full responsibility for all offsite shipments made from SRS.

WM serviced all generators of hazardous waste at SRS except the onsite security contractor, Wackenhut Services, Inc. The hazardous waste streams generated by Wackenhut at SRS include spent solvents from weapons cleaning, spent jet fuel from helicopter servicing, and other related solvents. Wackenhut sends this waste offsite for recovery and reuse through contracts begun and maintained by Wackenhut without the aid of WM.

SRS classifies its hazardous waste generation facilities as either RCAs or non-RCAs. The definition of an RCA is similar to the DOE-HQ definition of an RMMA (see definitions and comparisons in Section 4.3.2). Before the use of the term RCA, SRS called such facilities *regulated areas*, as defined by DPSOP 40, *Radiation and Contamination Control*.¹

Most facilities and processes that generate waste from the RCAs that WM manages are found at the reactors, separations, waste management, raw materials (that is, reactor materials), tritium production and management, and naval fuels areas. Other areas are the Savannah River Technology Center (SRTC) (formerly, the Savannah River Laboratory) and TNX facilities. Facilities that were strictly non-RCAs during the reporting period and that generated waste managed by WM include the Power Department facilities, Defense Waste Processing Facility, central shops (construction), motor pool, photography, and other miscellaneous facilities and areas.

The offsite shipments managed by WM include only nonradioactive hazardous and nonhazardous waste. Radioactive waste, mixed radioactive and hazardous waste, and municipal-type waste are all managed and stored or disposed of onsite.

On April 30, 1990, SRS ceased offsite shipments of hazardous waste that came from RCAs. DOE-SR lifted the moratorium on offsite shipments of RCA hazardous wastes on May 13, 1991. On May 17, 1991, DOE-HQ placed a moratorium on all RCA offsite waste shipments from DOE sites. Since this date, until DOE-HQ lifted the moratorium at the site, SRS has kept all hazardous waste in onsite storage. On October 27, 1992, after discovering that hazardous waste contaminated with a small amount of radioactivity had been shipped from a nonRCA to a commercial TSDF, SRS suspended offsite shipments of nonRCA waste. The shipment of hazardous wastes from nonRCAs to commercial TSDFs was restarted on May 27, 1994, when SRS had corrected the problem that resulted in the contaminated shipments.

4.1.2 Process

Before the 1991 moratorium banning all offsite shipments of waste from RCAs, WM used an offsite shipment process to ensure that SRS sent only nonradioactive hazardous waste (NRHW) offsite to RCRA-permitted facilities. This process is still in effect to characterize waste. SRS developed the process in the late 1970s when Federal regulation of hazardous waste began. Before 1987, the process consisted only of properly identifying waste. From 1987 to 1991, the process included not only identification, but backup measures to ensure that SRS sent only NRHW offsite.

The SRS offsite shipment process had three phases intended to ensure that hazardous waste met the requirements for unrestricted offsite release. These three phases were determination, validation, and confirmation. The waste generator performed the determination phase with the help of Health Protection Operations (HPO) immediately following generation of the waste. The generator and WM validated the determination before and after transferring the waste from the generator to WM. Confirmation was done by WM and HPO just before offsite release. Figure 2 shows these three phases and their accompanying steps from generation of waste to offsite shipment.

Many SRS procedures and several versions of each contained the mandates for the above three phases. SRS updated various procedures during the 1987–1991 offsite releases, while others remained unchanged. SRS WM provided most of these procedures to TSP. Following review of those SRS procedures in TSP's possession, TSP concluded that not all the steps of the SRS offsite shipping process as described during the site visit by SRS personnel are traceable to specific procedures.

The following is a description of the determination, validation, and confirmation phases of the SRS offsite shipment process. The following section includes a discussion of procedures where applicable. Section 4.2 contains a complete listing and description of the SRS procedures in TSP's possession.

4.1.3 Determination

The determination phase at the point of waste generation determined waste identity and possible radionuclide contamination. The waste generator and HPO agreed on a determination that each drum or package of waste was free of radioactive contamination. Figure 2 shows that the determination phase allowed only NRHW to continue in the offsite shipment process.

Waste generators used process knowledge, administrative controls, radiological surveys, and, sometimes, sampling and analysis to determine whether their waste was radioactive. Process knowledge included knowing the origin of the waste, whether it is from within an RCA or non-RCA facility. It also included history of the area, waste stream location, storage location, and materials and processes used in the generation of the subject waste. Radiation levels, transferable contamination, airborne activities, and potential hazards (see Section 4.3.2) all contributed to the classification of a facility as RCA or non-RCA. Information supporting this classification included results from HPO routine and nonroutine radiological control surveys within all process facility areas.

Procedures at SRS that supported determination included:

- *Identification and Handling of Radioactive (Mixed) and/or Non-Radioactive Hazardous Waste*, WM-AD-3009²
- *Identification of Radioactive (Mixed) or Non-Radioactive Hazardous Waste (NRHW)*, DPSOL 709-G-5³

Figure 2 SRS offsite shipment process

- *Identification, Analysis, Packaging, Labeling, and Shipping Requirements for Non-Radioactive Hazardous Waste (NRHW)*, DPSOD 138-16.⁴

The three procedures listed above are in reverse chronological order. TSP assumes that the newer procedures replaced the older ones. The most recently issued procedure on determination that also covers validation and transportation is *Hazardous Waste Buildings—Nonradioactive Hazardous Waste Acceptance Criteria*, WSRC-15, WAC 3.08.⁵

Each of the above procedures divided waste streams into the following three broad classes, based on the extent of available process knowledge: (a) known identity, (b) constituents known but not their percentage of the composition, and (c) completely unknown composition. The procedures required sampling and analysis for complete chemical and radiological characterization for both of the latter classes.

DPSOP 138-16⁴ initially divided the waste streams into those made entirely of raw (vendor) material and also classes of enough and not enough process knowledge. Each of these procedures also required sampling and analysis for new waste streams, waste streams for which the generating process had changed in any way, and annual waste stream recharacterization. WM's responsibilities included helping the generator to characterize the waste stream and complete the required paperwork.

Each of the three procedures excluded certain waste streams from classification as NRHW. These included excessed raw materials, PCB-contaminated waste, mixed waste, waste with radioactive contamination dispersed within, and compressed gas waste.

Each of the three procedures also mandated completion of the Hazardous Waste Storage/Disposal Record (Form OSR 29-3), the controlling document for hazardous waste shipments within the boundaries of SRS. The document required physical, chemical, and radiological descriptions. A separate document, OSR 29-15, *Mixed Waste Storage Record*, was used for mixed waste. OSR 29-3 also required package descriptions, potential hazards, and emergency action information. The generator prepared one form for each type of waste shipped from the generator to WM storage facilities.

Each of these procedures, and also DPSOL 709-G-2, *Handling and Storage of Radioactive and Non-Radioactive Hazardous Waste at Buildings 709-G/709-2G/709-4G/710-U and Solid Waste Storage Pad*,⁶ instructed WM not to accept waste at its facilities without a completed OSR 29-3. Before shipment from the generator to WM facilities, the OSR 29-3 also needed to receive approval from HPO and representatives of the Remember How You Treat Hazardous Materials (RHATHM) organization.

DPSOP 138-16⁴ further required completion of NRHW data sheets on each unique type of NRHW shipped. These sheets included all results of "HPO radioactive contamination check (if waste originates from a regulated area)." The check was to cover gross alpha, beta, and gamma radiation. WM-AD-3009² also required that "HPO shall survey each package for alpha, beta-gamma, and tritium before shipment."

Contamination Survey of Materials, Equipment, and Portable Facilities to be Released for Controlled or Uncontrolled Use, DPSOL 193-507,⁷ contained the exact procedures for radiological surveys of waste package surfaces. HPO personnel surveyed all waste packages coming from an RCA, regulated area, or radiation zone for fixed and transferable contamination, radiation fields, effects of neutron fluxes, and the presence of neutron emitters. SRS criteria for surveying waste packages during the reporting period of 1984–1991 were in DPSOL 193-507.⁷ The measuring equipment's minimum detectable activities (MDAs) are the basis for the criteria. The criteria were:

- Beta-gamma contamination survey—no contamination above background (i.e., no detectable contamination above MDA = 14,000 dpm/100 cm²)
- Alpha contamination survey—no detectable alpha contamination (i.e., no detectable contamination above MDA = 1,000 dpm/100 cm²)
- Smear survey—no removable contamination (i.e., <10 dpm/100 cm² alpha, <80 dpm/100 cm² beta-gamma, <150 dpm tritium above background of scaler).

SRS used a system of tagging waste containers to show HPO surface survey contamination status. The system had tags for waste from outside an RCA, waste from within an RCA that HPO had surveyed and cleared for unconditional release, waste from an RCA allowed to be released only under certain conditions, and waste determined to be radioactive. DPSOP 40¹ and DPSOL 193-507⁷ described and discussed the uses of these tags.

HPO tagged waste that was from outside an RCA and never went inside an RCA with a blue HPO tag signaling its non-RCA origin and unrestricted release approval. The HPO blue tag (OSR 4-552), as found in WSRC-1S, WAC 3.08,⁵ meant "each of the NRHW drums . . . has been generated outside an RCA and approved for unrestricted release."

An HPO green tag approved waste, materials, and equipment from within an RCA for uncontrolled use. The HPO green tag (OSR 4-44) was a contamination and radiation clearance tag used for approved, unconditional release of material, equipment, and facilities. According to DPSOL 193-507,⁷ "the tag is used if all surfaces (internal and external) of the subject in question are free of radiation and contamination." The criteria for surface contamination found in DPSOL 193-507 are listed above. The tag was valid for only 24 hours and required resurvey by HPO after this time. The tag was required to be removed from the container before the SRS boundary was crossed.

OSR 4-40 was a conditional release tag (for controlled use); it was white with black printing. According to DPSOL 193-507,⁷ the physical construction of the subject item "does not permit access to the internal surfaces for a complete survey and . . . unconditional release is not possible due to the history of the equipment." All accessible surfaces must be "free of contamination, and the possibility of internal contamination must be minimal." Personnel could handle equipment so tagged in clean areas, but it could not leave SRS. Only HPO personnel could remove the tag.

SRS used the yellow and magenta radiation tag (OSR 4-42) where there was a need to caution employees of radiation or contamination hazards. According to DPSOL 193-507,⁷ all subject materials "that do not meet controlled or uncontrolled release criteria shall be appropriately labeled with dose rates and contamination levels." Hazardous waste packages with caution (radiological condition) tags were transferred to WM for storage at the SRS mixed waste storage facility.

Other HPO tags included OSR 4-356, Material Shipment to Salvage, that were not used for removing anything from an RCA. All waste items reported in the SRS data submittal were tagged with either blue or green tags.

WM did not immediately ship offsite waste containers with blue or green HPO tags. These containers were still in the determination phase and were required to undergo validation and confirmation.

Except some solid lead oil waste, SRS kept all solid waste onsite. Waste that was liquid when it was initially placed in the drum was sampled before solidification treatment. This waste was then allowed to

continue through the offsite release process. The exceptions to this rule were some solid items with large surface to volume ratios (such as used rags) that HPO personnel could clear for release following careful surveys of entire surfaces.

Before 1990, DPSOL 193-507⁷ and DPSOP 40¹ stipulated the criteria for unconditional clearance. After 1990, *Health Protection Operations Manual*, 5Q1.2 (Procedure 507),⁸ and *Radiological Control, Manual 5Q*,⁹ specified the unconditional clearance criteria. If waste packages met those criteria (including process knowledge concurrence and surface survey criteria), then they were cleared for unconditional release.

The generator and HPO were always required to agree on a nonradioactive determination of waste based on process knowledge. Any disagreement resulted in classifying the waste as mixed waste and eliminating it from further consideration in the offsite release process.

4.1.4 Validation

As shown in Figure 2, following the determination phase and before shipment from the generator's facility to WM facilities, all waste packages designated as nonradioactive during the determination phase underwent validation. This phase consisted of satisfying procedural requirements of SRS's Traffic and Transportation (T&T) Department and other onsite organizations, including the RHYTHM coordinator, HPO, and WM.

First, samplers pulled a representative sample from each package for radiological screening. Sampling personnel normally gathered these samples into bulk composite samples to reduce the number of separate analyses required. They were then sent to an onsite laboratory. Initially, this laboratory was the SRTC. The SRTC developed the method of analyzing composite samples and validating sample analysis results as nonradioactive. The analytical methods included liquid scintillation and gamma spectroscopy. After tests determined the method's effectiveness, the SRTC transferred the methodology to the SRS Analytical Laboratories Department. Section 4.4 discusses this method and its development and limitations more fully. The Analytical Laboratories Department used passive-active neutron (PAN) analysis for some waste that operations could have contaminated with ²³⁵U.

WM required sampling and analysis of every drum in the validation phase. The only exceptions were some lab pack chemicals, where quantity requirements of the sample exceeded the quantity of waste, and some blue-tagged packages. Procedurally, radiological screening was part of the required documentation of *Packing and Receipt Requirements of Small Containers of Radioactive (Mixed) or Nonradioactive Hazardous Waste (NRHW)*, DPSOL 709-G-3.¹⁰

WM compared the results of the validation analyses to a limit chosen to ensure effectiveness of the determination phase. No specific SRS procedure imposed a limit for comparative purposes in the validation phase. The chosen limit was the U.S. Department of Transportation (DOT) radioactive shipment requirement of 2.0 nCi/g. This standard is from a DOT regulation, 49 CFR Part 173, Section 400,¹¹ that establishes radioactive shipment criteria. SRS must comply with this regulation; therefore, WM could also use the 2 nCi/g validation limit to determine compliance with the DOT requirement.

DOT requires any container of waste exceeding this standard to be shipped as radioactive waste, and labeled and placarded according to the requirements in 49 CFR Part 172 (Sections 300, 400, and 500).¹¹ Any item transported across roadways governed by DOT must be labeled as radioactive if it contains more than 2.0 nCi/g. This was not an SRS offsite release criterion. The SRS release criterion was no radioactivity above the analyzing equipment's MDA applied during the determination phase of the offsite

release process. The sampling, analysis, and comparison with 2.0 nCi/g during the validation phase were a test of the validity of the administrative procedures and controls carried out in the determination phase.

Because of analysis time requirements, WM did not review the results of this analysis immediately following sampling. As seen in the flowchart of Figure 2, the next step following sampling in the validation phase was the generator's completion of the Waste Characterization Form (WCF) that the generator sent to WM for approval. WM brought any concerns about the WCF to the generator at this point (the WCF is a companion to OSR 29-3).

Following WM, HPO, T&T, and RHYTHM approval of the WCF, the waste was ready for transportation to the WM facilities. *Shipping Non-Radioactive Hazardous Waste (U)*, DPSOL 709-G-1,¹² and *Interarea Shipments*, DPSOP 170,¹³ covered transportation. DPSOL 709-G-1 required completion of a T&T Transportation Work Request (OSR 12-57), initiated by the generator and requiring signature and copy tracking by the T&T supervisor, centralized trucking dispatcher, and T&T driver.

HPO input to complete the WCF includes surveys of accessible surfaces for alpha and beta-gamma contamination and beta-gamma radiation using portable survey instrumentation. When the shelf-life of the item had expired, HPO personnel surveyed the lab packs with factory seals intact on the accessible exterior surfaces for fixed and transferable contamination. For lab packs with the factory seal not intact, HPO personnel surveyed accessible exterior surfaces, threads or container lip, and inside the cap or lid for fixed and transferable radioactive contamination. DPSOL 709-G-2⁶ required WM to request HPO to survey all containers following WM review of OSR 29-3 and before acceptance of waste shipments at WM facilities.

Successfully completed and approved OSR 29-3 and OSR 12-57 forms allowed the packages to be moved from the generator's location to the SRS Hazardous Waste Storage Facility (HWSF), a RCRA-permitted WM storage area. Before entry into the HWSF, WM reviewed the waste for conformance with the offsite release process. Those packages judged to be in conformance were allowed into the HWSF. WM returned rejected packages to the generator to resolve any concerns.

By this time, the Analytical Laboratories Department delivered the analytical results of the composite samples to WM for their review. If the analytical results confirmed the administrative controls, then WM made a contract with a commercial entity for offsite treatment and disposal of the waste. This included transportation from SRS to the commercial facility, any intermediate treatment required before disposal, and disposal of the waste and its containers.

4.1.5 Confirmation

After making the contract and immediately before releasing the waste offsite, final checks confirmed that the waste was not radioactive. This confirmation phase of the offsite release process was the final phase. It consisted of HPO surveys of the container exteriors before loading the waste on the vendor truck. The defining procedure of the confirmation phase was *Offsite Shipment of NRHW Drums*, DPSOL 709-G-13.¹⁴ SRS offsite shipments of hazardous waste began on October 28, 1987. Before publication of DPSOL 709-G-13, WM checked each shipment using a special procedure that carried out the requirements later documented in DPSOL 709-G-13.

DPSOL 709-G-13 provided step-by-step guidance for offsite release. It required a system of applying colored dots to each container to maintain tracking, using drum and sample composite identification numbers.

The procedure required verifying the existence of a red dot on each drum intended for offsite shipment. The red dot meant that a sample was drawn from the package. Drums without this label required supervisory intervention before they could continue through the confirmation phase. Shipping personnel then prepared a blue dot for each drum with the corresponding sample composite number. The composite number was first checked to ensure that the analytical results were less than 2 nCi/g. Storage labels were removed from each, and the offsite drum listing record and an offsite shipment approval sheet were completed. The HWSF was then opened, and the vendor's truck backed in. Next, the procedure says to "have HPO clear drum exterior for shipment . . . obtain one green tag for each truckload of drums."

HPO surveys of exteriors of waste packages included surveys for transferable and fixed radioactive contamination using alpha and beta-gamma survey instrumentation. Personnel took swipes (disc smears) and counted them with sensitive counting room instrumentation. After 1990, the confirmation phase surveys included low-level radiation surveys using microrem instrumentation.

The procedures required a completed shipment checklist for each truckload of waste. This included proof of HPO clearance, DOT labeling conformance [such as accumulation start date, Environmental Protection Agency (EPA) waste codes, and State manifest numbers], and storage label removal. Finally, the drums were loaded on the vendor's truck and placarded properly, final supervisory inspection was done, and the final checklist form was completed. The vehicle was then transferred from WM facilities to the 713-A Shipping Department.

The confirmation phase included a quality assurance team audit on the waste containers to ensure compliance with applicable DOT shipping procedures. At this point, the offsite release process was complete, and the waste containers were shipped offsite after approval by HPO, WM, Quality Assurance, and the Environmental Protection Division.

4.2 Offsite Release Procedures

WM used many SRS procedures for guidance throughout the offsite release process. These contained step-by-step guidance and gave contamination limits. Multiple revisions followed the introduction of most of these procedures. This section summarizes the pertinent procedures involved in the offsite release process.

Figure 3 shows the applicable SRS procedures for offsite release and their evolution over several years. Major rewrites of procedures, their titles, and call numbers are noticeable for three periods: 1985–1987, 1988–1990, and 1991. A major rewrite of the procedures in the 1988–1990 period occurred because of the change of operating contractor at SRS from the E. I. DuPont de Nemours Company to the Westinghouse Savannah River Company on April 1, 1989. Table 2 summarizes all of the procedures discussed below.

4.2.1 SRS Procedures

This section includes a list of all procedures used by SRS in the determination, validation, and confirmation phases, except specific sampling and analysis procedures discussed in Section 4.4. Table 2 lists all of the procedures and gives a brief summary of their purpose. Appendix A also discusses the procedures listed below.

Figure 3 SRS offsite release procedures.

Table 2. SRS procedures for management of radioactive (mixed) and nonradioactive hazardous waste.

Issue date	Procedure number	Title	Description
5/90	DPSOL-709-G-1	Shipping Nonradioactive Hazardous Waste	Guidance for shippers of NRHW to WM buildings
5/89	DPSOL-709-G-2	Handling and Storage of Radioactive and Nonradioactive Hazardous Waste at Buildings 709-G, 709-2G, 709-4G, 710-U and Solid Waste Storage Pad	Instruction for receiving, storing, and inspecting NRHW stored at Buildings 709-G, 709-4G, and 710-U, and mixed waste stored at Building 709-2G
8/89	DPSOL 709-G-2A	Weekly Inspection Form for Nonradioactive/Radioactive Waste Storage	Guidance for continuous inspection logs for contents of WM buildings
1/89	DPSOL 709-G-3	Packing and Receipt Requirements of Small Containers of Radioactive (Mixed) or Nonradioactive Hazardous Waste (NRHW)	Requirements for packaging of small containers of NRHW and mixed waste
9/88	DPSOL-709-G-4	Handling and Packaging of Radioactive (Mixed) and Nonradioactive Hazardous Waste (NRHW)	Requirements for handling and packaging of NRHW and mixed waste sent to WM buildings
7/88	DPSOL 709-G-5	Identification of Radioactive (Mixed) and Nonradioactive Hazardous Waste (NRHW)	Guidance for categorizing various types of hazardous waste
5/90	DPSOL-709-G-6	Determination of Disposal Requirements for Nonradioactive Hazardous Waste (NRHW)	Guidance for determining proper disposal of NRHW
7/88	DPSOL 709-G-13	Offsite Shipment of NRHW Drums	Guidance for shippers in arranging shipment of NRHW drums
12/88	DPSOL-709-G-8	Overpacking and Redrumming Leaking NRHW and Mixed Hazardous Waste Drums	Instructions for redrumming or overpacking leaking NRHW and mixed waste drums
7/90	DPSOL-709-G-15	Hazardous Waste Procedures Index, 709-G Complex and 710-U	List of procedures to be used in training operators at WM buildings

Table 2. (continued).

Issue date	Procedure number	Title	Description
12/91	643-E-1001	Solid Waste Disposal Facility Operating Log	Checklist for recording daily activities within the disposal facility
9/91	241-FGH-1007	WMO General Logkeeping Practices	Guidance for WM logkeeping
1/90	DPSOL 193-507	Contamination Survey of Materials, Equipment, and Portable Facilities to be Released for Controlled or Uncontrolled Use	Instructions for performing and documenting radioactive contamination surveys on materials, equipment, and portable facilities
10/85	DPSOP 138-16	Identification, Analysis, Packaging, Labeling, and Shipping Requirements for Nonradioactive Hazardous Waste	Outlines steps for identifying, characterizing, packaging, and shipping NRHW to WM buildings
6/91	WM-AP-3009	Identification and Handling of Radioactive (Mixed) and/or Nonradioactive Hazardous Waste	Requirements for identifying and handling NRHW and mixed waste

Procedures supporting determination:

- *Identification and Handling of Radioactive (Mixed) and/or Non-Radioactive Hazardous Waste, WM-AD-3009²*
- *Identification of Radioactive (Mixed) or Nonradioactive Hazardous Waste (NRHW), DPSOL 709-G-5³*
- *Identification, Analysis, Packaging, Labeling, and Shipping Requirements for Nonradioactive Hazardous Waste (NRHW), DPSOP 138-16⁴*
- *Handling and Storage of Radioactive and Non-Radioactive Hazardous Waste at Buildings 709-G, 709-2G, 709-4G, 710-U and Solid Waste Storage Pad, DPSOL 709-G-2⁶*
- *Contamination Survey of Materials, Equipment, and Portable Facilities to be Released for Uncontrolled Use, DPSOL 193-507⁷*

Procedures supporting validation:

- *Packing and Receipt Requirements of Small Containers of Radioactive (Mixed) or Nonradioactive Hazardous Waste, DPSOL 709-G-3¹⁰*
- *Handling and Packaging of Radioactive and Nonradioactive Hazardous Waste (NRHW), DPSOL 709-G-4¹⁵*

Procedures supporting transportation:

- *Shipping Non-Radioactive Hazardous Waste (U)*, DPSOL 709-G-1¹²

Procedures supporting confirmation:

- *Offsite Shipment of NRHW Drums*, DPSOL 709-G-13¹⁴

Other procedures:

- *Weekly Inspection Form for Nonradioactive/Radioactive Hazardous Waste Storage*, DPSOL 709-G-2a¹⁶
- *Determination of Disposal Requirements for Nonradioactive Hazardous Waste (NRHW) (U)*, DPSOL 709-G-6¹⁷
- *Overpacking and Redrumming Leaking NRHW and Mixed Hazardous Waste Drums*, DPSOL 709-G-8¹⁸
- *Hazardous Waste Procedures Index, 709-G Complex and 710-U (U)*, DPSOL 709-G-15¹⁹
- *Solid Waste Disposal Facility Operating Log (U)*, 643-E-1001²⁰
- *WMO General Logkeeping Practices (U)*, 241-FGH-1007.²¹

4.3 Hazardous Waste Generating Facilities

4.3.1 Activities/Operations

SRS classified facilities generating hazardous waste as either RCAs or non-RCAs. SRS defined an RCA similarly to the DOE-HQ definition of an RMMA (see definitions and comparisons in Section 4.3.2).

As discussed in Section 4.1, facilities that generated hazardous waste include SRS reactors, separations, waste management, raw materials, tritium production and management, and naval fuels areas, the SRTC, and TNX facilities. All these generators had some facilities that were RCAs.

Those facilities that were strictly non-RCA from 1984 to 1991 and that generated waste managed by WM include SRS's power generation facilities, DWPF, central shops (construction), motor pool, photography, and other miscellaneous facilities and areas. SRS WM manages all onsite contractors' hazardous waste, except the onsite security contractor, Wackenhut Services, Inc.

Table 3 presents the facilities (or areas) that sent waste to WM control from 1987 to 1991. Each unique hazardous waste stream that WM shipped offsite during the period 1987–1991 is listed, along with whether it is from within an RCA. Specific building numbers and locations are not available.

Table 3. SRS hazardous waste generating facilities.

Generator	RCA?	Waste description
Central material receiving facility for Westinghouse Savannah River Company; stores PCB-contaminated waste	No	Organic solvents and laboratory chemicals (excess, expired)
	Yes	PCB-contaminated dielectric fluid from transformers
Central Services Works Engineering	No	Excess varnish solution
	No	Machining coolant and lubricant
	Yes	Oil
Central Shops Paint Department	No	Spent paint and paint solvents
	Yes	Spent paint and paint solvents
Construction contractor	No	Epoxy materials (shelf-life expired)
	Yes	Epoxy paint (shelf-life expired)
Construction contractor	No	Epoxy materials (shelf-life expired)
	Yes	Epoxy paint (shelf-life expired)
	No	Ethyl alcohol cleaning agent
	No	Lathe coolant with lead contamination
	No	Paint (shelf-life expired)
	No	Pipe coating (excess)
	No	Silver fixative from blueprint/microfilm transfer
	No	Solvent/lathe coolant mix
	No	Varnish (shelf-life expired)
	No	Waste paint solvents
	Yes	Waste paint solvents
	No	Water with benzene from underwater storage tank tests
	No	Liquid organic waste generated during liquid/liquid extraction process in HPO laboratory
	No	
	No	
Environmental Protection Department (Health Protection); group that provides environmental testing support	No	
M-Area; fabricates fuel and target assemblies	Yes	Empty drums, residue (last contained lead oil)
	Yes	Oil with lead powder (321-M)
	No	1,1,1 trichloroethane for degreasing (313-M)
M-Area; fabricates fuel and target assemblies (continued)	Yes	1,1,1 trichloroethane (313-M)
	Yes	Water, oil, and 1,1,1 trichloroethane

Generator	RCA?	Waste description
	Yes	1,1,1 trichloroethane (for degreasing) and spent paint solvents
Nuclear fuel facility; produces nuclear fuel for naval reactors	No	Solvent used for extraction of uranium in the nuclear fuel laboratory
Power Department; produces steam for use throughout SRS	No	Laboratory chemicals and waste
Reactor Works Engineering	No	Waste paint with methyl ethyl ketone
	Yes	Waste paint with methyl ethyl ketone
Savannah River Ecology Laboratory; conducts ecological research at SRS	No	Plant and animal research waste
Savannah River Technology Center	Yes	Isopropyl and toluene mixture (shielded cell window maintenance)
	No	Benzene and water mixture
	No	Integrated Precipitate Hydrolysis System (surfactant tests on nitrates and offgas)
	No	Water with benzene (Precipitate Hydrolysis Experimental Facility precipitates cesium from liquid waste)
Waste Management Operations, High-Level Liquid Waste Storage Facility	No	Water and tar mixture from construction activities

4.3.2 RMMA/RCA Classification

EM-30 defines an RMMA in the "Performance Objective for Certification of Non-Radioactive Hazardous Waste"^b as:

An RMMA is an area in which the potential exists for contamination due to the presence of unencapsulated or unconfined radioactive material or an area exposed to beams or other sources of particles (neutrons, protons, etc.) capable of causing activation. Operating procedures must specify the physical boundaries of areas qualifying as Radioactive Materials Management Areas (RMMAs) from which all waste streams exiting would be considered potentially contaminated. Radiological Areas, as defined in DOE Order 5480.11, are not necessarily RMMAs. Accident or variant conditions may require areas to be designated as temporary RMMAs until conditions are corrected. The boundaries of an RMMA may coincide with the site's Controlled Areas as defined in DOE Order 5480.11.

NOTE: It is important to note that no decision regarding potential for contamination may be based on the origin of the waste outside a radiological area as defined by DOE Order 5480.11. Because this definition is based on *threshold values* for dose, air concentration, or surface

b. Report from Jill E. Lytle, Associate Director, EM-30, "Performance Objective for Certification of Nonradioactive Hazardous Waste," November 15, 1991.

contamination level, it is not appropriate for decisions that involve no threshold levels of contamination (i.e., the DOE Order 5400.5 definition of "potential for contamination" and the definition of an RMMA).

SRS uses the term RCA, which is defined in the WSRC's *Radiological Control, Manual 5Q*.⁹ RCAs are not equivalent to RMMAs. The definition is as follows:

An RCA is an area to which access is controlled due to the presence or potential for the presence of radioactive materials or elevated radiation levels. Areas where during normal personnel occupancy an individual would receive 100 mrem body dose in a year or where the body dose rate is 2 mrem/hr or greater are defined as "elevated radiation level" areas. An RCA includes any radiological area (Radiation Area, High Radiation Area, Very High Radiation Area, Contamination Area, or Airborne Radioactivity Area) which is specifically defined for the purpose of increased radiological protection controls.

A Clean Area is any area not posted as an RCA. Clean Areas typically do not have radiation or radioactive contamination above natural background levels. Because of the design of some SRS facilities, some Clean Areas (which are not continuously occupied) may have a slight increase in radiation levels above natural background. Radioactive contamination shall always be maintained less than the following SRS Clean Area limits: <10 dpm/100 cm² for alpha contamination; <80 dpm/100 cm² for beta-gamma contamination; and <150 dpm/100 cm² for tritium (limits based on disk smear evaluation).

Before SRS issued Manual 5Q⁹ in 1990, the definitions were in DPSOP 40.¹ The procedure divided facilities into clean areas, regulated areas, and radiation zones.

A clean area was an area where no radioactive materials were handled, and where radiation and contamination levels were equivalent to natural background. Transferable contamination limits for inside a clean area were <10 dpm/100 cm² for alpha contamination, <80 dpm/cm² for beta-gamma, and <150 dpm/100 cm² for tritium, where applicable.

A regulated area was an area where radioactive materials were handled, or where radiation or contamination exceeded natural background. The radiation level could not exceed 300 mrad or 50 mrem/h, and contamination was below levels established by HPO supervision.

A radiation zone was an area where radiation or contamination levels exceeded the limits for a regulated area.

Hazardous waste generated within clean areas could be tagged with the HPO blue tag (OSR 4-552). Hazardous waste generated within any other type of facility was cleared for unconditional release and tagged with an HPO green tag (OSR 4-44) before going beyond the determination phase of the SRS offsite shipment process.

The difference between the DOE-defined RMMA and SRS-defined RCA is that an RCA is more stringently defined than an RMMA. Therefore, for this report, the SRS definition of an RCA is acceptable for defining areas to be RMMAs.

4.4 Radiological Screening

SRS submitted radioanalytical data for offsite shipments of hazardous waste made during 1987–1991. The radioanalytical data were from analyses performed in the validation phase of the offsite release process. Waste for which SRS did not submit analytical data included that known to be free from radioactive contamination because of process knowledge. Other waste containers for which SRS did not submit analytical data were released by HPO certification or their documentation had been lost (five manifests).

The DOT requires that nonradioactive shipments contain less than 2.0 nCi/g total radioactivity. WM screened shipments from an RCA, and some from outside RCAs, to ensure compliance with this requirement and to validate that administrative controls were working. SRS did not ship any mixed waste offsite; WM handled this waste onsite.

SRS did not ship waste offsite based solely on the 2.0 nCi/g criterion. Generators determined, either by process knowledge or analysis, that their waste was nonradioactive before WM accepted it for shipment. Agreement with HPO was required before WM considered any waste for offsite shipment. Figure 2 illustrates the process that SRS used for shipping hazardous waste offsite. After April 1990, SRS did not ship offsite any waste generated in an RCA. The following sections discuss techniques used for sampling and analysis of waste containers, and assess the analytical data.

4.4.1 Radiological Screening Procedures and Techniques

Once the generator and HPO declared a waste nonradioactive, WM validated this decision by taking samples from waste containers. The waste streams sampled were normally liquid wastes, such as paint waste and solvents, and aqueous or organic waste. Section 4.3 discusses generators of particular waste streams. Waste was shipped offsite in lab packs or 55-gal drums. Section 4.2 discusses procedures for screening lab packs. The next section discusses procedures for sampling and analyzing waste drums.

4.4.1.1 Sampling. SRS made only one sampling procedure for 1987–1991 available.²² Presentations given by SRS personnel contributed to some of the following discussion. Samples were taken from each drum to be shipped. Drums contained either liquid waste, such as spent solvents, or solid waste, such as solvent-contaminated rags. Liquids were sampled using methods from *Test Methods for Evaluating Solid Waste*, SW-846,²³ a collection of EPA-approved methods for sampling and analysis of waste. The only solids shipped offsite were those that personnel could survey easily. For example, for drums that contained solvent- or oil-contaminated rags, HPO personnel surveyed each rag individually using health physics instrumentation. Solids that had been liquids at some point could be sampled while in liquid form and analyzed. WM did not ship any other types of solid hazardous waste offsite.

Until December 1990, waste drum sampling was the responsibility of the generator and was usually done by a subcontractor. After this time, SRS formed a sampling group onsite that performed sampling of hazardous waste containers, as well as other types of sampling required onsite.

4.4.1.2 Composites. WM divided waste containers into groups of 20 or fewer (N) containers. Representative samples from all drums in each group were then made into one composite sample per group. Only samples of like materials were made into composites. Onsite laboratories analyzed each composite sample by gamma spectroscopy, liquid scintillation, or both. Some drums containing lead oil from the M-Area were surveyed by PAN analysis, which did not require sampling. This technique can survey an entire drum for ²³⁵U content. This waste was known to have no possible radioactive contaminant other than highly enriched uranium.

4.4.1.3 Analytical Techniques. Radioanalytical techniques used by SRS included liquid scintillation counting (LSC) and gamma spectroscopy. Liquid scintillation is an analytical technique that can detect beta- and alpha-emitting radionuclides. When beta and alpha particles travel through certain kinds of liquid organic chemicals, light is emitted. The LSC spectrometer detects the light using photomultiplier tubes. It can distinguish light accompanying the particles from other sources of light because it is always emitted in two directions. The spectrometer registers a count every time two photomultiplier tubes (180 degrees from each other) detect light beams in coincidence. Analysts dissolve samples in special kinds of liquids, called scintillation cocktails, and place them in the spectrometer so that they exclude outside light. This technique is less efficient for detecting any radioactive decay mode that does not emit a particle, such as gamma decay or electron capture.

Gamma spectroscopy, also called gamma pulse height analysis (PHA), is an analytical technique that detects gamma emissions and some x-ray emissions. A solid semiconductor material and associated electronics detect gamma rays. The detector response is proportional to the energy of the gamma ray impinging on the detector. Thus, the gamma spectrometer can not only detect the radiation, but can assign an energy to it if properly calibrated. Once the energy of the radiation is known, a trained spectroscopist or a computer program can normally identify the nuclide that emitted it. Solid semiconductor detectors using high purity germanium (HPGe) have excellent energy resolution. Using this type of spectrometer, operators can distinguish among many different gamma emitters in a sample.

Detection limits are an important aspect of laboratory analyses. No presently used instrumentation can detect radioactivity down to zero. Analysts can measure detection limits for most instruments. Various laboratories may use different methods and terminology. For the SRS gamma spectroscopy data, the programs used to analyze the gamma spectra were GELIGAM, an EG&G Ortec product, and GRABGAM, an SRS in-house product. The analyst can set these programs so that if the uncertainty of the gamma peak area is greater than a predetermined amount, the program will calculate an MDA for that nuclide at that peak. The MDA is specific to the sample. It is related to the counting time, counting efficiency at the peak's energy, and number of counts in the background at that energy.

Sometimes analysts refer to a lower limit of detection (LLD). This is the smallest concentration of an isotope in a sample that will give a net count above background that the system will detect with 95% probability. Thus, the LLD tells what amount of a radionuclide the system could detect given a particular counting time, efficiency, and background. The MDA gives the amount of a radionuclide in a particular sample that the system would detect if it had been present.

Liquid scintillation spectrometry is more suitable for determining the total amount of radioactivity in a sample. As part of the SRS sampling and analysis procedures, analysts used gamma PHA to ensure that they would not miss radionuclides decaying in modes not efficiently detectable by liquid scintillation. Liquid scintillation detectors measure beta and alpha radiation most efficiently. Some radionuclides decay by other modes. For example, liquid scintillation does not readily detect electron capture. Gamma spectrometers detect only gamma radiation. Since most electron capture radionuclides emit gamma radiation, gamma spectroscopy can detect those radionuclides not easily detectable by liquid scintillation. Thus, the two techniques work well together to determine total radioactivity in a sample.

SRS began shipping waste offsite in 1987. Before any shipments were made, an onsite radioanalytical laboratory developed a method for analyzing samples of waste. McDowell and Winn report data from 48 composites, analyzed in 1987 as part of the method development, in DPST-88-536.²⁴ As part of the method development, 909 drums of waste were sampled. These drums were later shipped as part or all of the waste on 17 separate manifests. WM shipped most of the waste containers analyzed to Rollins Environmental Services (RES) facilities in Baton Rouge, Louisiana, and Bridgeport, New Jersey. WM

also shipped some to a Chemical Waste Management (CWM) facility in Chicago, Illinois. Analysts did not formally report data from other composites, but analyzed them by the techniques discussed in DPST-88-536.²⁴ This document contains the only available description of how the original 48 composites were analyzed.

After September 1989, a facility support analytical laboratory analyzed the waste samples using the same procedures. Although SRS did not provide procedures dating from September 1989, SRS personnel gave that date as the one on which the WM laboratory took over the analyses. The earliest sampling and analysis procedures that SRS made available begin in February 1990.²⁵

The method developed in DPST-88-536²⁴ was written into procedures for liquid scintillation and gamma spectroscopy.^{25, 26, 27} The only changes made were for liquid scintillation. The ³H efficiency was used for all energies instead of just for the ³H energy band. This change made the final analytical values even more conservative. Also, the length of the gamma count was standardized at six hours. By June 1991, analysts decided that the gamma analysis added little information to the data. After this, only every tenth sample analyzed by liquid scintillation was also analyzed by gamma spectroscopy as a check on the liquid scintillation results.

Few changes, other than those discussed above, were made to analytical procedures during the reporting period. Those changes made were minor and should not have affected either the conservatism in the liquid scintillation method or the MDA of any of the analytical methods. However, the minimum detectable activity for gamma spectroscopy is specific for each isotope and each spectrum. It may vary significantly between samples even though counting times and all other factors are the same.

4.4.2 Radiological Screening Data

This section assesses the analytical data for waste shipped offsite. To assess the quality of radioanalytical data, TSP required some or all of the documentation listed in Appendix B. Not all of the documents listed are required for all cases. For determining whether data are good enough to give the actual amount of a radionuclide present in the sample, TSP would require all of the listed documentation. The purpose here is to decide if the waste samples show the presence of any DOE-added radioactivity above zero. For this purpose, TSP would not require some of the quality documentation.

The documentation available for evaluation of SRS data included procedures for gamma pulse height analysis and liquid scintillation analysis. These procedures were overall procedures that covered sample preparation, energy and efficiency calibrations, actual analysis, and calculations required to reach a result in nanocuries per gram. Also included were a data analysis report and handwritten data results for 48 composites. SRS could not provide procedures covering the entire period. Old procedures are usually destroyed so that personnel use only the most current procedures. However, the discussion in DPST-88-536 is sufficient to determine the adequacy of the method used.

The data analysis report, DPST-88-536,²⁴ states that, for each composite, a best estimate and a conservative estimate were calculated using the liquid scintillation analytical data. A specific definition of these estimates is given in DPST-88-536 and can be found in Appendix H of this document. If the conservative estimate was greater than 2.0 nCi/g, the composite samples from the drums were split into two sets of N/2 composite samples. (N is the number of drums in the original composite.) The analysts could continue this process until N was equal to one. However, only two composites exceeded the 2.0 nCi/g criterion and were split into new composites. For these samples, N was never less than five.

The best estimate and results from the HPGe gamma analysis were then added to make an average concentration over all of the drums in the composite. Since most gamma emitters are also beta or alpha emitters, this addition adds to the conservatism of the result. A worst-case concentration was calculated by multiplying the composite average concentration by the number of drums in the composite. This calculation was based on the hypothesis that all activity in the sample might be found in a single drum of the composite. If this worst possible estimate exceeded 2.0 nCi/g, the sample was divided into two sets of N/2 waste containers and was made into new composites. Only when a composite worst-case estimate was less than 2.0 nCi/g were the drums in the composite considered suitable for shipment offsite. None of the 909 waste containers sampled in this analysis were found unfit to send offsite as nonradioactive hazardous waste. Most of the analyses resulted in radionuclide concentrations of less than 0.1 nCi/g, which was about the detection limit of the method.

TSP has divided the radioanalytical data for drums shipped offsite from SRS into four groups. The first group has only liquid scintillation data, and the second group has only gamma spectroscopy data. The third group consists of samples for which both types of analysis were used. The fourth group of data consists of PAN analyses, used only for some lead oil waste from the M-Area. Each of these groupings will be considered separately below. Table 4 presents the types of data and the recommendations for their use in determining if waste drums contain DOE-added radioactivity. These recommendations are further discussed in the rest of this section.

Analysts gathered the liquid scintillation data to ensure that no drums shipped offsite exceeded the DOT criterion of 2.0 nCi/g. Therefore, the analysts incorporated multiple conservatisms into the analytical technique. These included:

- Incomplete subtraction of luminescence background.
- Nonsubtraction of natural radioactivity (matrix) backgrounds, including naturally occurring radioactive material.
- Use of ^{14}C efficiency for all nuclides other than ^3H . The ^{14}C efficiency yields a conservatively high activity for most possible non-natural radionuclides. After the transfer to a WM laboratory discussed above, a tritium efficiency was used for all nuclides, making the result even more conservative.

Table 4. Types of analytical data.

Data type	Number of manifests	Total weight (kg)	Recommendation
Liquid scintillation	53	139,608	Do not use
Gamma spectroscopy	29	137,067	Investigate and explain positive readings
Both	44	289,644	Use only gamma data
Passive-active neutron	3	27,426	Classify drums with positive readings as radioactive
Lost documentation	6	13,310	No data available

- ^3H activity is conservatively large because the analysts did not correct for background from higher energy beta emitters.
- Worst-case sample activity in a composite assumes all activity of composite in one waste container. This is unlikely, although technically possible.

Because of the multiple conservatisms, the liquid scintillation data are not suitable for measuring the exact radioactive content of the drums. Nor are they suitable for determining whether DOE operations have added any radioactive contamination to the hazardous waste. Therefore, TSP will not use the liquid scintillation data further in this evaluation. All drums for which the only data available are liquid scintillation data will be treated as if no data were available.

Gamma spectroscopy can detect only gamma emitters. Some gamma emitters that DOE operations could have added include ^{137}Cs , ^{60}Co , and ^{235}U . Many other non-natural radionuclides emit gamma rays with enough intensity to be detectable by gamma spectroscopy without using extreme methods, such as very long counting times. This technique, however, cannot detect many other possible radioactive contaminants, such as ^{90}Sr , ^{239}Pu , ^{99}Tc , ^{14}C , and ^3H .

For many reasons, computer programs for analyzing gamma spectra can make incorrect identifications of radionuclides. For example, the major peak for ^{235}U , most often used by computer programs to analyze for ^{235}U , is very close to a peak for ^{226}Ra (a natural radionuclide). A gamma analysis program may not be able to distinguish between them, although an experienced gamma spectroscopist can often do so. Gamma analyses of ^{235}U should not be used to assert positively that ^{235}U is present without other supporting information. Another example is ^{109}Cd . The major peak for ^{109}Cd is at 88 keV, an area of the spectrum likely to contain several confusing background peaks. ^{109}Cd emits this gamma ray for only about 3% of total decays. Thus, any ^{109}Cd analytical results reported in the SRS data must be considered doubtful.

Similar problems exist for other radionuclides. Thus, for all drums for which gamma spectroscopy detected non-natural radionuclides above a minimum detectable activity, further investigation was required. Table C-1 in Appendix C lists the manifests for which only gamma data are available.

Where analysis detected gamma emitters, SRS investigated the data to determine if the radionuclides could represent DOE-added radioactivity. Appendix G contains a report written by SRS analysts. The report accounts for all of the gamma emitters detected in waste samples as false positives or background radiation. Appendix G also contains a short evaluation of the SRS report by an independent gamma spectroscopy expert. This evaluation agrees that the positive gamma results reported by SRS are probably false positives or background radiation. An exception might be ^{57}Co , which the independent expert suggested needed further explanation. SRS did not supply further justification for designating the ^{57}Co results as false positives. Since the SRS report and independent evaluation agree that no true positive gamma analytical results other than possibly ^{57}Co were found in the SRS data, TSP will categorize this waste with gamma analytical results as clean. Composites with positive ^{57}Co results will be categorized as unknown until a resolution of the ^{57}Co question is achieved. SRS has categorized this waste as clean.

For composites for which SRS provided both liquid scintillation and gamma spectroscopy data, the liquid scintillation data will be abandoned. Only the gamma spectroscopy data were further investigated as detailed above. Since the conclusions discussed above also apply to these gamma analytical results, TSP will categorize those shipments as clean, because no true positive gamma analytical results were

found for any of these shipments, with one exception discussed below. Table C-2 in Appendix C lists manifests for which both liquid scintillation and gamma data were available.

SRS used PAN analysis to detect ^{235}U in some drums of solid waste that could not be analyzed by a method that required sampling. Of the drums analyzed by this method, 20 had results that suggested the drum contained some ^{235}U above the detection limit. The contents of some drums were later transferred into plastic lab packs before shipment offsite. All of the drums for which positive ^{235}U results were reported were shipped to a CWM incinerator in Chicago, Illinois. The text of an SRS report on these shipments is given in Appendix F. An independent PAN expert was asked to evaluate this report. His evaluation is also included in Appendix F. Both the SRS analyst and independent expert agree that the positive ^{235}U analytical results are probably real. Waste items for which PAN analytical data were reported are listed in Table C-3 in Appendix C. Specific drums for which positive PAN analytical values were reported are listed in Table C-4 in Appendix C.

Drums of M-Area lead oil waste that could be sampled for analysis were analyzed using gamma spectroscopy. Initially, positive ^{235}U results from these analyses were discounted because of possible confusion with ^{226}Ra , as discussed above. However, SRS and TSP agreed that for this waste, with a real potential to contain ^{235}U , discounting the positive ^{235}U results was not justifiable. Therefore, drums of waste with positive ^{235}U analyses above background have been categorized as radioactive. Eight of these drums were sent to the CWM incinerator in Chicago on three different manifests.

Further investigation of all waste shipments by SRS has revealed that some tetrabutyl titanate waste containing tritium was shipped to a CWM incinerator in Sauget, Illinois. A total of 55 drums of this tritium-contaminated waste was sent to the incinerator in Sauget in 1992. Also, some shipments containing tritium went to the RES incinerator in New Jersey, including two drums in 1990, and 39 drums went to the RES incinerator in Baton Rouge, Louisiana, in 1992.

Once TSP had initiated the process to determine what shipments were radioactive by current standards, SRS investigated shipments made outside the time frame investigated by TSP. This investigation revealed some shipments discussed in the previous paragraph. Also, SRS discovered that some shipments made in 1992 and 1993 were from an area that had not been considered an RMMA, but where some waste was analytical waste spiked with various radioisotopes. Standard analytical methods used by SRS for waste samples were not adequate to discover these isotopes. However, these shipments have been identified by process knowledge and are now considered radioactive. These shipments are listed in Appendix E, Table E-2. The radionuclides involved were isotopes of plutonium, uranium, strontium, and yttrium in very small quantities (from use of a trace spike). These shipments are considered radioactive by process knowledge. SRS has taken steps to ensure that such shipments can no longer be made to facilities not licensed to handle radioactivity.

5. SUMMARY DISCUSSION

Some SRS hazardous waste shipments reported in the data submittal were not properly categorized according to the DOE-HQ definitions of clean, likely clean, likely radioactive, or known radioactive. SRS categorized all waste shipments from within an RCA as likely clean and all waste shipments from outside an RCA as clean. As the diagram in Figure 1 shows, if valid analytical data exist for waste shipments, the site must categorize the waste as either clean or radioactive. Analytical data were available for many waste shipments reported by SRS, but SRS did not use them to aid in the categorization.

For the categorization of the hazardous waste shipments, the SRS definition of an RCA fits within the bounds of the DOE-HQ definition of an RMMA.

SRS began offsite shipment of hazardous waste in 1987, using an offsite shipment process to ensure that only NRHW was shipped offsite. Although SRS has not formally documented the process in procedures, SRS representatives state that they have followed the three phases of the process (determination, validation, and confirmation) since the start of offsite release in 1987.

SRS reported analytical results for almost every hazardous waste shipment sent offsite from 1987 through 1991. Where applicable, these analytical data were the basis for determining the correct waste categories. This report also includes a table of shipments made in 1992 and 1993 that may have included radioactivity. TSP has not seen all of the analytical data used to make these determinations. The shipments for those years are included in the report for completeness.

Because of the extreme conservatism incorporated in the liquid scintillation methodology, TSP has disregarded liquid scintillation analytical data for categorization of the waste items. For these shipments, TSP will categorize waste items from within an RCA as likely clean and waste items from outside an RCA as clean. SRS reported 720 drums or lab packs and 13 tankers with only liquid scintillation results. The total weight of these shipments was 352,242 lb. The 720 drums or lab packs were included in 178 manifested waste shipments. The 13 tankers each had its own manifest. Of these, TSP will categorize 597 drums or lab packs (on 169 manifests) as clean, and 123 drums (on nine manifests) as likely clean. Twelve tankers, each with its own manifest, contained only clean waste. One drum, shipped to the RES incinerator in Bridgeport, New Jersey, was categorized as radioactive. A different procedure was used for this sample, making it possible to detect that the waste contained tritium above background. One tanker, analyzed by the LSC method that can determine tritium, detected no DOE-added radiation. However, the tanker was later identified by process knowledge as containing DOE-added radioisotopes. That tanker, shipped to RES-NJ on 12/17/91, is categorized radioactive. These manifests are listed in Table C-3 in Appendix C.

Waste items for which positive gamma analytical results were reported were investigated. SRS determined that none of the analytical results for shipments were true positive. An independent evaluation agreed that this was the case. Therefore, no manifests for which gamma analytical data were reported have positive analytical results, except eight drums from the M-Area that contained ^{235}U . TSP will categorize all waste items for which gamma analytical results were reported as clean, except the drums containing ^{235}U , which are categorized as radioactive. The evaluation of positive gamma analytical results for waste is included in Appendix G. SRS reported 725 drums with only gamma analytical results. These waste items were included in 30 manifested waste shipments including 290,734 lb of waste. Of these, TSP will categorize 115 drums, on five manifests, as likely clean, because the data supplied by SRS were inadequate for a determination and these drums were from RMMAs. TSP will categorize eight drums, on three manifests, as radioactive. The remainder, 603 drums, on 29 manifests, are categorized as clean. Waste items with gamma analytical results are listed in Appendix C, Table C-1.

A total of 1,628 drums or lab packs, weighing 647,117 lb (on 43 manifests), had both gamma and liquid scintillation data. For these items, the liquid scintillation data were abandoned, except some tritium results, and positive gamma analytical results were required to be explained. Twenty-five drums on four manifests were categorized as radioactive. Two of these drums were radioactive by process knowledge, one contained ^{235}U , and 22 contained tritium, as revealed by liquid scintillation. TSP categorized 31 drums on two manifests as likely clean, because the gamma analytical data were inadequate to make a determination, and the drums came from RMMAs. The remaining 1,572 drums or lab packs, on 43 manifests, were categorized as clean.

Some drums of lead oil waste from the M-Area were analyzed by PAN analysis. Several of these drums had positive ^{235}U results. TSP will categorize these drums as radioactive. An independent evaluation of the PAN analytical results and a critique of the evaluation are included in Appendix F. SRS reported 148 waste items with PAN results. The three manifested shipments reporting 27,426.47 kg of waste were sent to a CWM in Chicago, Illinois. Twenty drums of M-Area waste had positive PAN analytical results; some of these may have been transferred to other containers before shipping. The total amount of radioisotopes known to have been sent to the CWM incinerator in Chicago is estimated to be 39 μCi , in 1,415 gal. A dose assessment has been done to estimate the amount of possible exposure for workers at the facility and nonworkers near the facility. The waste items for which PAN analysis results were reported and the analytical data for the 20 drums of waste are listed in Appendix C.

SRS did not report analysis results for the remainder of the waste items. These waste items were released by HPO certification or were reported as having lost documentation. Waste items shipped under HPO green tags were surveyed; the surfaces were determined to have less radioactivity than the limits allowed by DOE Order 5400.5. For these waste items, TSP will categorize waste from within an RCA with a green tag as clean. Waste from outside an RCA and having a blue tag or other health physics certification is clean. Items with lost documentation from within an RMMA are likely clean. SRS reported 1,534 drums or lab packs without analysis results for volume contamination, weighing 153,662 lb, on 84 manifests. TSP will categorize 138 drums or lab packs as likely radioactive because documentation suggests possible ^{235}U . TSP will categorize 57 drums or lab packs from RMMAs as likely clean because of lost documentation. The remainder, 1,339 drums or lab packs, are clean.

SRS reported 150 manifested waste shipments from 1984 to 1991 that covered 4,755 drums or lab packs and 13 tankers. Of these waste items, TSP will categorize 4,251 as clean (including 12 tankers), 326 as likely clean, 138 as likely radioactive, and 55 as radioactive (including one tanker).

SRS has also investigated hazardous waste shipments made in 1992 and 1993. TSP has not seen all of the analytical data used to categorize these shipments. However, SRS used the same procedure that TSP has used to categorize the waste in these shipments. Although these shipments were not originally part of the scope intended to be covered by this report, TSP has included, in Appendix D, a table that covers all manifests reported to TSP by SRS on shipments made in 1992 and 1993. TSP does not know whether SRS made other hazardous waste shipments during these years. The table covers 393 drums or lab packs and seven tankers, weighing 363,804 lb, on 14 manifests. SRS categorized 58 drums or lab packs as radioactive, either because of analytical results or by process knowledge. The process knowledge covered more of the waste spiked with radioisotopes discussed above. Sixteen drums were categorized as likely radioactive because, although radioanalytical results were not usable, the waste was similar in form and area of origin to a waste categorized as radioactive.

For all shipments categorized as radioactive or likely radioactive, SRS performed dose assessments. Louisiana State University has also completed an independent dose assessment for shipments of

radioactively contaminated wastes made to the Rollins incinerator in Bridgeport, New Jersey. While the dose assessments are outside the scope of this report, they are listed in the references.²⁸⁻³¹

6. REFERENCES

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Appendix A

SRS Procedures

Appendix A

SRS Procedures

A.1 PROCEDURES SUPPORTING DETERMINATION

IDENTIFICATION AND HANDLING OF RADIOACTIVE (MIXED) AND/OR NONRADIOACTIVE HAZARDOUS WASTE (WM-AP-3009) (Rev. 0, 6-11-91)

This procedure establishes requirements and responsibilities for the identification and handling of radioactive or nonradioactive hazardous waste. It refers to WM-AP-3003 (Establishing Satellite Areas for Storage of Hazardous or Mixed Waste), WM-AP-3001 (Establishing Staging Areas for 90 Day Storage of Hazardous/Mixed Waste), WM-AP-3013 (Drum Identification and Management), 241-FH-811 (Sampling and Sample Tracking), and 138-9FGH-190 (Hazardous Waste Staging Areas Inspection) as well as other Federal, State, and SRS requirements, procedures, and guidelines.

The procedure gives guidance for identification and handling of liquid and solid hazardous waste and dictates procedure monitoring requirements. It also provides appendices and attachments outlining the various criteria for hazardous waste. The Handling section includes the following, regarding shipments from generator to WM: "... Health Protection shall survey each package for alpha, beta-gamma and tritium before shipment."

Other responsibilities discussed in the procedure are "... WM Facility Ops Chem Coordinator shall assist facility (generator) in identification and disposition of waste, coordinate sampling of unknown waste in accordance with 241-FH-811, prepare waste characterization and shipping documentation before shipment"

Some identification requirements of this procedure are:

"... If necessary, the Ops Chem Coordinator shall coordinate the sampling process in accordance with 241-FH-811 ..."

"... process knowledge shall be used to characterize waste if knowledge of the process is accurately documented"

"... analytical methods of characterization shall be used if waste composition is unknown."

Requirements in this procedure for handling hazardous waste include:

"... if waste has been identified as hazardous or mixed or has the potential of being hazardous or mixed, it must be stored in a satellite area in accordance with WM-AP-3003, or in a staging area in accordance with procedure WM-AP-3011."

"The generator shall meet the following requirements before shipment to Hazardous/Mixed Waste Storage Buildings: ... Complete the Hazardous Waste Storage/Disposal Record (OSR 29-3) or the Mixed Waste Storage Record (OSR-29-15). Required information ... radiological constituent(s) and respective amounts at time of generation, ... laboratory analysis, if available."

Also, a "detailed description of the waste shall include . . . radionuclide composition."

IDENTIFICATION OF RADIOACTIVE (MIXED) OR NONRADIOACTIVE HAZARDOUS WASTE (NRHW)
(DPSOL 709-G-5) (Rev. 1, 7/88)

This procedure informs personnel of the different types of hazardous waste and the criteria by which substances can be identified. It defines what waste materials are considered hazardous (according to EPA and SCDHEC definitions). Hazardous materials are considered in this procedure to be hazardous waste when they are discarded or intended to be discarded.

The procedure refers to 40 CFR Part 261 (Identification and Listing of Hazardous Wastes), SCDHEC Hazardous Waste Management Regulations, and other Federal, State, and SRS procedures, guidelines, and regulations.

The procedure makes it the responsibility of each generator to identify accurately and categorize any waste that is hazardous. It requires WM not to accept any NRHW for storage without chemical and physical descriptions provided by the generator. The procedure requires that raw material cannot be classified as waste (must be returned or used).

The following are sections of this procedure: Sample Methods and Sampling Frequency, Test Methods, Required Information and Analysis Parameters, and Waste Identity.

The Sampling section requires representative sampling (samples that exhibits average properties of whole waste). Samples must be taken from 25% of containers containing a particular type of waste. These samples will be bulked (into composites) and an analysis will be made from the bulked sample. Samples from different types of waste cannot be mixed into a composite. Different types of waste cannot be bulked into a mixture nor can similar waste generated from different jobs.

The Sampling Frequency portion requires sampling for new waste stream generation, WM spot checks, process changes, and annual recharacterization of waste streams.

The Test Methods section refers to "Test Methods for Evaluating Solid Waste," EPA SW-846.

The Required Information and Analysis Parameters section requires that before shipment and storage, the generator shall describe how waste was produced and packaged, use only DOT-approved containers compatible with waste types, label properly (filling date, waste category, contents, hazardous waste label), vent for volatile liquids, and that incompatible types not be placed in the same container. It also requires the generator to complete a Hazardous Waste Storage/Disposal Record (OSR 29-3) and give a copy of OSR 29-3 to WM along with Transportation Work Request (OSR 12-57).

Other data required from the generator in this section include supplying material safety data sheets (MSDSs) and results of analyses performed on samples of waste. Information required to be included for solid waste are physical description, percent composition of each part if a mixture, and MSDSs or equivalent. For liquid waste physical description, percent composition of each part if a mixture, specific gravity, pH, viscosity, flashpoint, and MSDS or equivalent must be included. Sludge waste is a type of waste containing both liquid and undissolved solids. An example is used paint thinner that has paint pigment as well as thinner. For sludges, information required for solid waste and liquid waste must be included and the percentage of liquid and undissolved solid.

IDENTIFICATION, ANALYSIS, PACKAGING, LABELING, AND SHIPPING REQUIREMENTS FOR NONRADIOACTIVE HAZARDOUS WASTE (NRHW) (DPSOP 138-16) (Rev. 0, 10-85)

This procedure outlines steps involved with identifying, characterizing, packaging, and shipping NRHW to WM for storage in Buildings 710-U, 709-G, and 709-4G. The procedure refers to SCDHEC hazardous waste management regulations (R.61-79.261 through R.61-79.264), SRP Procedures Manual, Item 512 (trash, scrap, and salvage), DPSOP 302 (trafficking/transport department), DPSOP 138-3 (waste handling facilities), DPSOP 170 (interarea shipments), DPSOP 370 (SRP hazardous waste facilities), DPSOP 40 (special hazards bulletin 5), DPSOP 15-1 (400 area power), and other Federal, State, and SRS procedures and guidelines.

The procedure contains five parts: I. Identification of NRHW, II. Analysis/Documentation Requirements, III. Packaging/Labeling Requirements, IV. Procedures for Shipping and Storing, and V. Disposition of Nonradioactive excessed raw materials and bulk chemicals that are not hazardous waste. This procedure combines many elements of other procedures (WM-AP-3009 and 709-G-5).

Section II includes waste generator requirements for completing OSR 29-3, a copy of which is included. It also includes a copy of "NRHW Data Sheet" and instructions for completing this form. Also included is a copy of "Transportation Work Request" (OSR 12-57).

If waste originated from within a "regulated area," HPO must check all waste to be stored as NRHW for radioactive contamination. If gross alpha and gross beta-gamma laboratory check is "warranted by HPO," then the data are required to be recorded in the blanks provided on OSR 29-3.

If sampling and analysis of NRHW is necessary to meet the requirements of the procedure, the procedure states that an independent outside laboratory must perform sampling and analysis (vendor services). This does not apply to any waste known to contain radioactivity.

HANDLING AND STORAGE OF RADIOACTIVE AND NON-RADIOACTIVE HAZARDOUS WASTE AT BUILDINGS 709-G, 709-2G, 709-4G, 710-U AND SOLID WASTE STORAGE PAD (DPSOL 709-G-2) (Rev. 9, 5-19-89)

This procedure discusses receiving, storing, and inspecting NRHW stored at 709-G, -4G, 710-U and "Mixed (radioactive and hazardous) waste/material" stored at 709-2G (Mixed Waste Storage Facility). Buildings 709-G, 709-4G, and 710-U store NRHW materials. Building 709-2G stores mixed radioactive and hazardous waste materials. The procedure refers to DPSOL 40-1, DPSOL 200-FH-7, DPSOL 709-G-2A (Inspection), DPSOP 370 (SRS Hazardous Waste Facilities), and Federal, State, and other SRS procedures, statutes, and guidelines.

The procedure contains six sections: A. Receiving, B. Logging, C. Storing, D. Weekly Inspections, E. Container Rupture, and F. Fire.

Section A. (Receiving) requires review of "Hazardous Waste Storage/Disposal Record (OSR 29-3)" that is attached to containers for each type of waste. For receipt of mixed waste (709-2G only) shipments, all paperwork must be complete.

CONTAMINATION SURVEY OF MATERIALS, EQUIPMENT, AND PORTABLE FACILITIES TO BE RELEASED FOR CONTROLLED OR UNCONTROLLED USE (DPSOL 193-507) (Rev. 3, 1/22/90)

This procedure includes instructions for performing and documenting radioactive contamination surveys on materials, equipment, and portable facilities to be released for controlled or uncontrolled use. It provides guidelines on packaging, cleaning, and tagging material, equipment, and facilities for transport on SRS.

The procedure describes guidelines, criteria, instrumentation, and documentation required to perform a material, equipment, and facilities contamination survey for a conditional or unconditional release but does not cover: materials having radioactivity dispersed within, materials made radioactive by neutron irradiation, contaminated soils, or contaminated clothing and people.

The procedure refers to DPSOP 40 (Radiation and Contamination Control), DPSOP 170 (Interarea Shipments), DPSOL 292-608 (Control of Measuring and Test Equipment), DPSOL 193-107 (Documenting Radiation Surveys), and DOE Order 5480.11 (Radioactive Waste Management).

Instrumentation required includes portable survey instruments (Thyac with an HPO-210 probe or equivalent), portable alpha instrument (Ludlum or equivalent), and smear count system (such as M&TE Cat. 1).

All materials, equipment, and facilities are surveyed for unconditional or conditional release status if they are stored or used in contamination, high contamination, or airborne radioactivity areas. HPO has the authority to make the survey requirement include all material, equipment, and facilities stored or used within an RCA.

Conditional/unconditional release criteria are:

- Beta-gamma contamination survey—no detectable contamination above background. Normal detection efficiency for beta-gamma instrument is 15%, corresponding to 14,000 dpm/100 cm² for small area contamination.
- Alpha contamination survey—no detectable alpha contamination. Normal detection efficiency for alpha instrumentation is 50%, corresponding to 1000 dpm/100 cm² for small area contamination.
- Smear survey—materials, equipment, and facilities smeared with a 100-cm² smear are not considered to have removable contamination if a measurement by a scaler is <10 dpm alpha, <80 dpm beta-gamma, <150 dpm tritium (each above background of scaler).

The procedure further describes tagging guidelines for use of green (unconditional), black and white (conditional), and yellow/magenta (radiation) tags. Also described in the procedure are documentation requirements for release of materials, equipment, and facilities, including the Radiation Survey Logsheet (OSR 4-17), which must include complete results of surveys.

A.2 PROCEDURES SUPPORTING VALIDATION

PACKING AND RECEIPT REQUIREMENTS OF SMALL CONTAINERS OF RADIOACTIVE (MIXED) OR NONRADIOACTIVE HAZARDOUS WASTE (DPSOL 709-G-3) (Rev. 3, 1-18-89)

This procedure gives requirements for packaging of small containers of mixed radioactive and hazardous waste or NRHW. The procedure satisfies EPA regulations (40 CFR 264.316) on overpack of lab packs; large containers of bulk hazardous waste packaging are covered by DPSOL 709-G-4.

Radioactivity for waste to be stored in Building 709-2G must be <500 dpm alpha/ft², 1,000 cpm/ft² beta-gamma (requires notification of WM supervisor if package exceeds these limits). The procedure requires the following of the generator:

If a package has been opened and used, radiation screening must be performed by SRL-ETD or WM. For a new waste stream, EPA-laboratory chemical analysis is required. For an old stream, chemical screening is required (EPA-laboratory not required).

If a package has not been opened, and the contents remain in a pure form, an MSDS can be used for characterization. Radiation screening is still required.

HANDLING AND PACKAGING OF RADIOACTIVE AND NONRADIOACTIVE HAZARDOUS WASTE (NRHW) (DPSOL 709-G-4) (Rev. 2, 9-88)

This procedure informs waste generators of requirements for the handling and packaging of hazardous wastes that is to be sent to WM (Buildings 709-G, 710-U, 709-4G, and 709-2G).

The procedure refers to DPSOL 709-G-1 (shipping NRHW), DPSOL 709-G-2 (handling/storage of radioactive and NRHW), DPSOL 709-G-3 (disposal of small containers of mixed waste and NRHW), and DPSOL-G-5 (identification of mixed waste and NRHW), and other Federal, State, and SRS regulations and guidelines.

The procedure requires waste identified as hazardous (by DPSOL 709-G-5) to be sent to interim storage at hazardous waste or mixed hazardous and radioactive waste storage facilities. Other requirements are:

Hazardous waste cannot be stored at a generator's facility for more than 90 days. Before shipment, the waste must be properly analyzed, identified, and categorized under DPSOL 709-G-5. It must be packaged in a DOT approved container. It must be properly labeled and approved for shipment by DPSOL 709-G-1. All low-level mixed waste shall be stored in 709-2G by procedure 709-G-2. All small containers (up to 5 gallons) shall be overpacked by DPSOL 709-G-3 before shipment.

A.3 PROCEDURES SUPPORTING TRANSPORTATION

SHIPPING NONRADIOACTIVE HAZARDOUS WASTE (U) (709-G-1) (Rev. 2, 5/17/90)

This procedure gives guidance for shippers of NRHW to WM (Buildings 709-G, 710-U, and 709-4G). It refers to 709-G-3 (disposal), 709-G-4 (handling/packaging), and 709-G-5 (identification of mixed waste and NRHW).

When this procedure is completed and reviewed, it becomes a record sent to the area records coordinator for processing in accordance with WM 17-1. The generator (shipper) is required to prepare an HW Storage/Disposal Record (OSR 29-3). The receiver (WM) is required to inform the shipper that a completed OSR 29-3 is required and to inform the shipper that both chemical analysis (or MSDS) and a radiological analysis of container contents must accompany a shipment (under 709-G-5).

A.4 PROCEDURES SUPPORTING CONFIRMATION

OFFSITE SHIPMENT OF NRHW DRUMS (DPSOL 709-G-13) (Rev. 0, 7-88; Rev. 1, 9-88)

This procedure gives guidance to be followed by shippers in arranging shipment of NRHW drums. It refers to SRP Procedure Manual, Item 512, DPSOP 370 (SRP Hazardous Waste Facilities), DPSOL 709-G-1 (Shipping NRHW), DPSOL 709-G-3 (Disposal of Small Containers of Radioactive and NRHW), DPSOL 709-G-4 (Handling and Packaging of Radioactive and NRHW), and DPSOL 709-G-5 [Identification of Radioactive (Mixed) or NRHW].

The procedure provides step-by-step instructions for checking drum identification numbers for sampling and verifying sampling results were approved for unrestricted offsite release. Also included are removal of storage labeling, application of required DOT labeling, interface with an offsite transportation vendor, obtaining final HPO clearance, transportation truck placarding, and completion of all required SRS final documentation (Offsite Drum Listing Record, Hazardous Waste Offsite Shipment Approval Sheet, Shipment Checklist, Final Checklist Form).

A.5 OTHER PROCEDURES

WEEKLY INSPECTION FORM FOR NONRADIOACTIVE/RADIOACTIVE HAZARDOUS WASTE STORAGE (DPSOL 709-G-2A) (Rev.0, 8-9-89)

This procedure gives guidance for continuous inspection logs for the contents of WM Buildings 709-G, 709-2G, 709-4G, 710-U. It refers to DPSOL 40-1 and DPSOL 200-FH-7. The form provided in the procedure does not require waste packages to receive surface contamination surveys on a weekly basis.

DETERMINATION OF DISPOSAL REQUIREMENTS FOR NONRADIOACTIVE HAZARDOUS WASTE (NRHW) (U) (709-G-6) (Rev. 2, 5-17-90)

This procedure outlines the steps involved in determining the proper disposition of nonradioactive hazardous waste (NRHW). WM at Burial Ground facilities has the responsibility for determining waste disposal requirements.

The procedure refers to SRS Procedures Manual, Item 512 (Trash, Scrap, and Salvage), Manual 138-3 (Waste Handling Facilities), Manual 170 (Interarea Shipments), Manual 370 (SRS Hazardous Waste Facilities), 709-G-1 (shipping), 709-G-2 (handling/storage), 709-G-3 (disposal), 709-G-4 (handling/packaging), and 709-G-5 (identification).

The procedure contains a flowchart with the following decision points:

- Is waste radioactive? (If yes, handle per Manual 40, Special Hazards)
- If no, is waste raw or recyclable material? (If yes, return to vendor/process)

- If no, is waste usable elsewhere onsite? (if yes, contact other users)
- If no, sample and analyze according to 705-G-5
- Is waste burnable in 484-D Powerhouse? (If yes, ship to 484-D per Manual 15-1)
- If no, does waste contain hazardous components? (If yes, classify as NRHW)
- Is waste declared hazardous by generator? (If yes, classify as NRHW)
- If no, (classify as nonradioactive, nonhazardous waste material)
- Also, is waste contained in small containers? (if no, categorize per 709-G-4, Part III); (if yes, categorize per 709-G-5, Part III and package per 709-G-3, Overpacks)

Other generator requirements in this procedure are to label waste packages per 709-G-1, contact WM before shipping, send an advance copy of OSR 29-3, analytical data, and MSDS to WM, and ship NRHW to the appropriate hazardous waste storage facility as directed by WM and 709-G-1.

OVERPACKING AND REDRUMMING LEAKING NRHW AND MIXED HAZARDOUS WASTE DRUMS (DPSOL 709-G-8) (Rev. 5, 12-5-88)

This procedure gives instructions for redrumming and overpacking leaking NRHW drums at WM Buildings 710-U, 709-G, or 709-4G and for leaking mixed radioactive and hazardous waste drums at Building 709-2G. Neither section requires any additional radiological screening, sampling, or analysis following such instances.

HAZARDOUS WASTE PROCEDURES INDEX, 709-G COMPLEX AND 710-U (U) (709-G-15) (Rev. 0, 7-24-90)

This procedure provides a list of procedures used in training operators at the 709-G complex and 710-U.

SOLID WASTE DISPOSAL FACILITY OPERATING LOG (U) (643-E-1001) (Rev. 1, 12-18-91)

This procedure provides a checklist to record daily activities within the Solid Waste Disposal Facility. It refers to Manual S1 (Nuclear Materials Processing Division Organization Manual), 241-FEH-1007 (WM General Logkeeping Practices). Section 4.7 is titled "Radiological Conditions" and contains space for recording any unusual HPO observations such as VAMP and CAM alarms.

WMO GENERAL LOGKEEPING PRACTICES (U) (241-FGH-1007) (Rev. 1, 9-4-91)

This procedure provides guidance for WM logkeeping. It refers to Radiation and Contamination Control—for Tank Farms (200-FH-50, Manual 5Q1.1), for ETF (200-FH-97, Manual 5Q1.1), for SWDF (200-FH-7, Manual 5Q1.1).

Section 4.3.2.2 of this procedure requires recording any changes in readings from the following area process monitoring or detection equipment: radiation detection equipment, CAMs, or hydrogen monitors. Section 4.3.2.10 of the procedure also requires recording significant changes in radiological conditions/levels.

Appendix B

Documentation Needed for Evaluating Laboratory Data

Appendix B

Documentation Needed for Evaluating Laboratory Data

1. Procedures for sampling, spectroscopy, laboratory preparation of samples, use of computers in analysis, calculation of final results, quality assurance, and anything else applicable to the specific sample.
2. Quality records
 - Quality plan, discussing all procedures for ensuring desired quality in the data.
 - Calibration procedures.
 - Internal quality control sample records for applicable time periods: documentation of any quality control samples run by the laboratory before and after the sample was analyzed.
 - Standards documentation
 - Showing traceability to NIST or similar agency
 - Procedure for creating standards.
3. Efficiency calibrations procedures for spectrometers and geometries used. An efficiency curve for a spectrometer will show what percentage of radiation from the sample is actually seen by the detector.
4. Computer spectral analysis: the printout that analyzes the spectrum for peaks, uses the energy calibration to assign energies to those peaks, and uses a radionuclide library to determine which radionuclides correspond to energy peaks found in the spectrum. It usually also subtracts instrument background and uses the efficiency calibration to determine real activities.

Appendix C

Waste Shipments by Type of Analytical Data

Table C-1. Waste items analyzed by gamma pulse height analysis.^a

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
IL2039154	1	550	- 55 GAL. DRUM (LEAD OIL D008)	Y	1	C
IL2039154	10	5,500	- 55 GAL. DRUM (LEAD OIL D008)	Y	11	C
IL2039154	4	2,200	- 55 GAL. DRUM (LEAD OIL D008)	Y	12	C
IL2039154	3	1,650	- 55 GAL. DRUM (LEAD OIL D008)	Y	13	C
IL2039154	7	3,850	- 55 GAL. DRUM (LEAD OIL D008)	Y	14	C
IL2039154	2	1,100	- 55 GAL. DRUM (LEAD OIL D008)	Y	15	C
IL2039154	1	550	- 55 GAL. DRUM (LEAD OIL D008)	Y	16	C
IL2039154	1	550	- 55 GAL. DRUM (LEAD OIL D008)	Y	17	C
IL2039154	1	550	- 55 GAL. DRUM (LEAD OIL D008)	Y	18	C
IL2039154	1	550	- 55 GAL. DRUM (LEAD OIL D008)	Y	2	C
IL2039154	3	1,650	- 55 GAL. DRUM (LEAD OIL D008)	Y	22/2.4E-5 nCi/g	R
IL2039154	3	1,650	- 55 GAL. DRUM (LEAD OIL D008)	Y	3	C
IL2039154	2	1,100	- 55 GAL. DRUM (LEAD OIL D008)	Y	4	C
IL2039154	3	1,650	- 55 GAL. DRUM (LEAD OIL D008)	Y	5	C
IL2039154	3	1,650	- 55 GAL. DRUM (LEAD OIL D008)	Y	6	C
IL2039154	5	2,750	- 55 GAL. DRUM (LEAD OIL D008)	Y	7	C
IL2039154	5	2,750	- 55 GAL. DRUM (LEAD OIL D008)	Y	8	C
IL2039154	4	2,200	- 55 GAL. DRUM (LEAD OIL D008)	Y	9	C
IL2039154	1	550	- 55 GAL. DRUM (LEAD OIL D008)	Y	96/ ¹³⁷ Cs 9.1E-3 nCi/g, ²³⁵ U 1.24 nCi/g	R
IL2039155	3	1,512	- 55 GAL. DRUM (LEAD OIL D008)	Y	1	C
IL2039155	3	1,512	- 55 GAL. DRUM (LEAD OIL D008)	Y	10	C
IL2039155	4	2,016	- 55 GAL. DRUM (LEAD OIL D008)	Y	11	C
IL2039155	2	1,008	- 55 GAL. DRUM (LEAD OIL D008)	Y	13	C
IL2039155	1	504	- 55 GAL. DRUM (LEAD OIL D008)	Y	15	C
IL2039155	9	4,528	- 55 GAL. DRUM (LEAD OIL D008)	Y	16	C
IL2039155	10	5,032	- 55 GAL. DRUM (LEAD OIL D008)	Y	17	C
IL2039155	5	2,520	- 55 GAL. DRUM (LEAD OIL D008)	Y	18	C
IL2039155	1	504	- 55 GAL. DRUM (LEAD OIL D008)	Y	19	C
IL2039155	2	1,008	- 55 GAL. DRUM (LEAD OIL D008)	Y	2	C
IL2039155	2	1,008	- 55 GAL. DRUM (LEAD OIL D008)	Y	22/2.4E-5 nCi/g	R
IL2039155	6	3,024	- 55 GAL. DRUM (LEAD OIL D008)	Y	3	C

a. For manifests with only gamma data: if positive gamma results, explain. If not explained, categorize as radioactive. Otherwise, categorize as clean.

Table C-1. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
IL2039155	2	1,008	- 55 GAL. DRUM (LEAD OIL D008)	Y 4		C
IL2039155	2	1,008	- 55 GAL. DRUM (LEAD OIL D008)	Y 5		C
IL2039155	2	1,008	- 55 GAL. DRUM (LEAD OIL D008)	Y 6		C
IL2039155	1	504	- 55 GAL. DRUM (LEAD OIL D008)	Y 7		C
IL2039155	3	1,512	- 55 GAL. DRUM (LEAD OIL D008)	Y 8		C
IL2039155	1	504	- 55 GAL. DRUM (LEAD OIL D008)	Y 9		C
IL2093344	2	930	- 55 GAL. DRUM (LEAD OIL D008)	Y 1		C
IL2093344	4	1,860	- 55 GAL. DRUM (LEAD OIL D008)	Y 10		C
IL2093344	2	930	- 55 GAL. DRUM (LEAD OIL D008)	Y 11		C
IL2093344	4	1,860	- 55 GAL. DRUM (LEAD OIL D008)	Y 12		C
IL2093344	6	2,790	- 55 GAL. DRUM (LEAD OIL D008)	Y 13		C
IL2093344	4	1,860	- 55 GAL. DRUM (LEAD OIL D008)	Y 14		C
IL2093344	5	2325	- 55 GAL. DRUM (LEAD OIL D008)	Y 15		C
IL2093344	1	465	- 55 GAL. DRUM (LEAD OIL D008)	Y 16		C
IL2093344	1	465	- 55 GAL. DRUM (LEAD OIL D008)	Y 18		C
IL2093344	5	2,790	- 55 GAL. DRUM (LEAD OIL D008)	Y 2		C
IL2093344	1	465	- 55 GAL. DRUM (LEAD OIL D008)	Y 3		C
IL2093344	6	2,791	- 55 GAL. DRUM (LEAD OIL D008)	Y 4		C
IL2093344	4	1,863	- 55 GAL. DRUM (LEAD OIL D008)	Y 5		C
IL2093344	1	465	- 55 GAL. DRUM (LEAD OIL D008)	Y 6		C
IL2093344	3	1,396	- 55 GAL. DRUM (LEAD OIL D008)	Y 7		C
IL2093344	2	930	- 55 GAL. DRUM (LEAD OIL D008)	Y 8		C
IL2093344	5	2,325	- 55 GAL. DRUM (LEAD OIL D008)	Y 9		C
IL2093345	6	2,886	- 55 GAL. DRUM (LEAD OIL D008)	Y 1		C
IL2093345	6	2,886	- 55 GAL. DRUM (LEAD OIL D008)	Y 10		C
IL2093345	5	2,405	- 55 GAL. DRUM (LEAD OIL D008)	Y 12		C
IL2093345	3	1,443	- 55 GAL. DRUM (LEAD OIL D008)	Y 13		C
IL2093345	4	1,914	- 55 GAL. DRUM (LEAD OIL D008)	Y 14		C
IL2093345	2	962	- 55 GAL. DRUM (LEAD OIL D008)	Y 15		C
IL2093345	3	1,443	- 55 GAL. DRUM (LEAD OIL D008)	Y 16		C
IL2093345	2	962	- 55 GAL. DRUM (LEAD OIL D008)	Y 17		C
IL2093345	2	962	- 55 GAL. DRUM (LEAD OIL D008)	Y 18		C

Table C-1. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
IL2093345	2	962	- 55 GAL. DRUM (LEAD OIL D008)	Y	2	C
IL2093345	3	1,443	- 55 GAL. DRUM (LEAD OIL D008)	Y	3	C
IL2093345	3	1,443	- 55 GAL. DRUM (LEAD OIL D008)	Y	4	C
IL2093345	3	1,443	- 55 GAL. DRUM (LEAD OIL D008)	Y	5	C
IL2093345	6	2,886	- 55 GAL. DRUM (LEAD OIL D008)	Y	6	C
IL2093345	5	2,405	- 55 GAL. DRUM (LEAD OIL D008)	Y	7	C
IL2093345	3	1,443	- 55 GAL. DRUM (LEAD OIL D008)	Y	8	C
IL2093345	5	2,405	- 55 GAL. DRUM (LEAD OIL D008)	Y	9	C
IL2093346	3	1,349	- 55 GAL. DRUM (1,1,1 TRICHLOROETHANE SLUDGE D008)	Y	1	C
IL2093346	3	1,467	- 55 GAL. DRUM (LEAD OIL D008)	Y	10	C
IL2093346	1	489	- 55 GAL. DRUM (LEAD OIL D008)	Y	12	C
IL2093346	2	978	- 55 GAL. DRUM (LEAD OIL D008)	Y	13	C
IL2093346	2	978	- 55 GAL. DRUM (LEAD OIL D008)	Y	14	C
IL2093346	6	2,934	- 55 GAL. DRUM (LEAD OIL D008)	Y	15	C
IL2093346	2	978	- 55 GAL. DRUM (NOT SPECIFIED ON DOCUMENTATION. SHIPPED AS LEAD OIL D008)	Y	17	C
IL2093346	2	978	- 55 GAL. DRUM (LEAD OIL D008)	Y	18	C
IL2093346	4	1,838	- 55 GAL. DRUM (LEAD OIL D008)	Y	2	C
IL2093346	4	1,956	- 55 GAL. DRUM (WATER/OIL MIXTURE WITH TRICHLOROETHANE D008)	Y	20	C
IL2093346	5	2,445	- 55 GAL. DRUM (LEAD OIL D008)	Y	21	C
IL2093346	3	1,467	- 55 GAL. DRUM (LEAD OIL D008)	Y	3	C
IL2093346	1	489	- 55 GAL. DRUM (LEAD OIL D008)	Y	36	C
IL2093346	1	489	- 55 GAL. DRUM (LEAD OIL D008)	Y	371/ ²³⁵ U 1.88 nCi/g, ¹³⁷ Cs 1.5E-2 nCi/g	R
IL2093346	3	1,349	- 55 GAL. DRUM (LEAD OIL D008)	Y	4	C
IL2093346	1	489	- 55 GAL. DRUM (LEAD OIL D008)	Y	40/ ¹³⁷ Cs 9.6E-3 nCi/g, ²³⁵ U 1.14 nCi/g	R
IL2093346	4	1,956	- 55 GAL. DRUM (1,1,1 TRICHLOROETHANE SLUDGE D008)	Y	5	C
IL2093346	4	1,956	- 55 GAL. DRUM (LEAD OIL D008)	Y	6	C
IL2093346	2	978	- 55 GAL. DRUM (LEAD OIL D008)	Y	7	C
IL2093346	2	978	- 55 GAL. DRUM (TRICHLOROETHANE D008)	Y	8	C
IL2093346	1	489	- 55 GAL. DRUM (1,1,1 TRICHLOROETHANE SLUDGE D008)	Y	9	C
LA1093838	3	1,450	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-19/NO USEFUL DATA	LC
LA1093838	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-21/NO USEFUL DATA	C

Table C-1. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
LA1093838	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-22/NO USEFUL DATA	C
LA1163777	1	50	- 55 GAL. DRUM (LABORATORY CHEMICALS/WASTE NOT RCRA REGULATED)	N	34BSR4/ ²³⁵ U 9.5E-3 nCi, ¹³⁷ CS 1.3E-3 nCi	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D340/NO POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D37/NO POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D30/ ²⁰³ Hg 1.8E-02 nCi	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D39/DATA ILLEGIBLE	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D42/ ⁵⁷ Co 2.3E-1 nCi SEVERAL POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D22/SEVERAL POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D26/ ¹⁰⁹ Cd 6.1E-1 nCi	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D44/ ¹⁴⁴ Ce 1.1E-1 nCi, ²⁰³ Hg 2.3E-2 nCi	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D35/SEVERAL POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D31/NO POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D20/NO POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D21/NO POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D28/ ¹⁴⁴ Ce 1.8E-01 nCi, ²⁰³ Hg 1.1E-02 nCi	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D29/ ⁵⁴ Mn 2.6E-2 nCi	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D24/ ⁵⁷ Co 1.3E-1 nCi	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D41/NO POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D46/NO POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D40/NO POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D45/ ¹⁰⁹ Cd 4.3E-01 nCi, ¹³⁹ Ce 6.0E-02 nCi	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D27/ ¹⁰⁹ Cd 1.3 nCi	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D27/ ¹⁰⁹ Cd 5.5 E-1	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D175/ ⁵⁷ Co 1.3 nCi	U
LA1164168	1	300	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	125-CDWPF-2/ ⁵⁷ Co 3.0E-2 nCi	U
LA1208376	11	4,630	- 55 GAL. DRUM (MACHINE COOLANT/OIL D008)	N	MC42/ ¹⁰⁹ Cd 8.0E-02 nCi	C
LA1208378	4	1,200	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	MS269/ ¹⁰⁹ Cd 1.2 nCi, ¹⁴⁴ Ce 1.1E-1 nCi	C
LA1208379	6	2,400	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, D018)	N	310-BE5/ ¹³⁹ Ce 3.5E-2 nCi	C
LA1208387	29	1,300	- 55 GAL. DRUM (LABORATORY CHEMICALS/WASTE. NOT RCRA)	N	MS-259/ ⁵⁷ CO 3.9E-2 nCi, ⁵⁴ Mn 2.2E-2 nCi	U
LA1208387	4	1,920	- 55 GAL. DRUM (ETHYLENE GLYCOL/ARSENIC D004, D067)	N	MS-10/ ²³⁵ U 6.0E-3 nCi	C
LA1208392	1	50	- 55 GAL. DRUM (LAB CHEMICALS/WASTE D018, D019, D028, D029, D039, D040, D043)	N	MS-259/ ⁵⁷ CO 3.9E-2 nCi, ⁵⁴ Mn 2.2E-2 nCi	U

Table C-1. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
LA1208396	38	2,045	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001, D002)	N	MS-87/NO POS. γ	C
LA1208426	2	900	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001, F003, D008)	N	C-68/NO POS. γ	C
LA1208426	1	450	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001, F003)	N	WS0187/ ^{57}Co 3.9E-1 nCi	U
LA1208429	1	500	- 55 GAL. DRUM (LAB CHEMICALS/WASTE F003, D0010)	N	MS-223/ ^{235}U 5.3E-3 nCi	C
LA1208430	1	500	- 55 GAL. DRUM (LAB CHEMICALS/WASTE D001, F003)	N	MS-10-1/ ^{235}U 6.8E-3 nCi	C
LA1208430	1	500	- 55 GAL. DRUM (LAB CHEMICALS/WASTE D001, F003)	N	MS224/ ^{235}U 4.6E-3 nCi	C
LA1208436	1	500	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001, F003, D008, F005)	N	MS238/NO POS. γ	C
LA1208442	13	520	- 55 GAL. DRUM (MISC. CONSTRUCTION WASTE D001)	N	MS74/ ^{113}Sn 3.7E-2 nCi	C
LA1208442	15	550	- 55 GAL. DRUM (MISC. CONSTRUCTION WASTE D001, D035)	N	MS98/NO POS. γ	C
LA1208443	16	800	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001)	N	BSR108/ ^{57}Co 1.6E-02 nCi, ^{141}Ce 3.4E-02 nCi	C
LA1208443	8	2,405	- 55 GAL. DRUM (MISC. CONSTRUCTION WASTE, D001)	N	MS-105/VARIOUS POS. γ	C
LA1208444	7	385	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001)	N	MS-99/SEVERAL POS. γ	C
LA1208446	7	2,450	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F001)	N	MS41/ ^{137}Cs 8.2E-03 nCi, ^{235}U 5.1E-03 nCi	C
LA1208446	8	2,880	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001, F003, D008, F005)	N	BSR-107/SEVERAL POS. γ	C
NJA0667270	8	3,656	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-23/NO USEFUL DATA	C
NJA0667270	8	3,656	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-26/NO USEFUL DATA	C
NJA0667270	8	3,656	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-27/NO USEFUL DATA	C
NJA0667270	3	1,371	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-29/NO USEFUL DATA	C
NJA0667270	5	2,285	- 55 GAL. DRUM (NEUTRALIZED ALUMINUM NITRATE)	N	C-29/NO USEFUL DATA	C
NJA0667270	8	3,656	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-30/NO USEFUL DATA	C
NJA0667270	4	1,828	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	C-32/NO USEFUL DATA	LC
NJA0667270	8	3,656	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	C-33/NO USEFUL DATA	LC
NJA0667272	1	440	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	N	C-24/NO USEFUL DATA	C
NJA0667272	4	1,760	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-32/NO USEFUL DATA	LC
NJA0667272	8	3,520	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-38/NO USEFUL DATA	LC
NJA0667272	1	440	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-38/NO USEFUL DATA	LC
NJA0667272	2	880	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-39/NO USEFUL DATA	LC
NJA0667272	5	2,200	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-39/NO USEFUL DATA	LC
NJA0667272	9	3,960	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-40/NO USEFUL DATA	LC
NJA0667272	7	3,080	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-40/NO USEFUL DATA	LC

Table C-1. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
NJA0667272	5	2,200	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-41/NO USEFUL DATA	LC
NJA0667272	3	1,320	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	N	C-41/NO USEFUL DATA	C
NJA0667272	8	3,520	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	N	C-43/NO USEFUL DATA	C
NJA0667272	4	1,760	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	N	C-44/NO USEFUL DATA	C
NJA0667272	4	1,760	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	N	C-45/NO USEFUL DATA	C
NJA0667272	4	1,760	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-47/NO USEFUL DATA	LC
NJA0667272	6	2,640	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003)	Y	C-49/NO USEFUL DATA	LC
NJA0667276	2	800	- 55 GAL. DRUM (MACHINE COOLANT)	Y	MC10/NO DATA	LC
NJA0667277	6	2,988	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	T-1/NO DATA	LC
NJA0667277	6	2,988	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	N	T-10/NO DATA	LC
NJA0667277	2	996	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	T-2/NO DATA	LC
NJA0667277	1	498	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	T-3/NO DATA	LC
NJA0667277	2	996	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	T-35/NO DATA	LC
NJA0667277	6	2,988	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	T-4/NO DATA	LC
NJA0667277	5	2,490	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	T-5/NO DATA	LC
NJA0667277	3	1,494	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	N	T-6/NO DATA	LC
NJA0667277	1	498	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	T-7/NO DATA	LC
NJA0667277	4	1,992	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	T-8/NO DATA	LC
NJA0667277	12	5,976	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	T-9/NO DATA	LC
NJA0667278	1	384	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	N	C-82-3/ ¹⁰⁶ Ru 1.7E-01 nCi	C
NJA0667278	1	385	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	N	C-82-4/ ⁵⁷ Co 7.4E-2 nCi, OTHERS	U
NJA0667278	1	438	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-83-1/NO POS. γ	C
NJA0667278	1	438	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-83-2/ ⁵⁷ Co 5.5 E-02 nCi	U
NJA0667278	1	439	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-83-4/ ⁶⁵ Zn 6.6E-02 nCi, ¹⁴⁴ Ce 1.1E-01 nCi	C
NJA0667278	4	1,754	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-86/NO DATA	C
NJA0667278	4	1,537	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	N	C-87/SEVERAL GAMMA EMITTERS	C
NJA0667278	4	1,537	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	N	C-88/SEVERAL GAMMA EMITTERS	C
NJA0667278	1	384	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	N	C-82-2/NO DATA	C
NJA0667278	1	300	- 55 GAL. DRUM (MISC. CONSTRUCTION WASTE (SHELF LIFE) D001)	N	MS-119/ ¹⁵² Eu 3.3E-02 nCi	C
NJA0667278	5	2,200	- 55 GAL. DRUM (SPENT PAINT SOLVENT F001)	N	MS-227/ ⁵⁷ Co 6.2E-02 nCi, ¹⁴⁴ Ce 0.4E-02 nCi	U
NJA0667278	7	2,520	- 55 GAL. DRUM (SPENT PAINT (SHELF LIFE) D001)	N	MS-91/ ¹⁴⁴ Ce 5.3E-2 nCi	C

Table C-1. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
NJA0667288	2	714	- 55 GAL. DRUM (MOTOR OIL, GASOLINE, WATER MIXTURE, D001, D018)	N	317-BSR-1-230-1	C
NJA0667288	1	357	- 55 GAL. DRUM (MOTOR OIL, GASOLINE, WATER MIXTURE, D001, D018)	N	319-BSR-230-2	C

Table C-2. Waste items analyzed by both liquid scintillation counting and gamma pulse height analysis.^a

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite/data	Category
LA1035009	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	13/NO POS. γ	C
LA1035009	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	14/NO POS. γ	C
LA1035009	4	2,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	15/ ¹³⁷ Cs 1.1E-04 nCi	C
LA1035009	2	1,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	16/ ¹³⁷ Cs 1.5E-05 nCi, ⁶⁰ Co 2.7E-05 nCi	C
LA1035009	3	1,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	17/ ¹³⁷ Cs 1.9E-04 nCi	C
LA1035009	2	1,000	- 55 GAL. DRUM (ORGANIC SOLVENTS F003, F005, D008, D001)	Y	19/NO POS. γ	C
LA1035009	2	1,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	32/NO POS. γ	C
LA1035009	6	3,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	37/NO POS. γ	C
LA1035009	16	8,470	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	38/NO POS. γ	C
LA1035009	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	39/NO POS. γ	C
LA1035009	2	1,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	40/NO POS. γ	C
LA1035009	1	510	- 55 GAL. DRUM (ORGANIC SOLVENTS F003, F005, D008, D001)	Y	46/NO POS. γ	C
LA1035009	13	6,120	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	47/NO POS. γ	C
LA1035009	5	2,510	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	48/NO POS. γ	C
LA1035010	3	1,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	19/NO POS. γ	C
LA1035010	17	10,010	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	35/NO POS. γ	C
LA1035010	1	510	- 55 GAL. DRUM (ORGANIC SOLVENTS F003, F005, D008, D001)	Y	36/NO POS. γ ; RADIOACTIVE BY PROCESS KNOWLEDGE	R
LA1035010	9	4,610	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	36/NO POS. γ	C
LA1035010	14	5,880	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	37/NO POS. γ	C
LA1035010	4	2,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	38/NO POS. γ	C
LA1035010	10	5,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	39/NO POS. γ	C
LA1035010	3	1,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	40/NO POS. γ	C
LA1035013	3	1,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	23/NO POS. γ	C
LA1035013	5	2,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	25/NO POS. γ	C
LA1035013	7	3,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	26/NO POS. γ	C
LA1035013	2	1,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	30/NO POS. γ	C
LA1035013	17	8,880	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	31/NO POS. γ	C
LA1035013	4	2,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	33/NO POS. γ	C
LA1035013	10	4,820	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	34/NO POS. γ	C
LA1035013	6	3,100	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	36/NO POS. γ	C

a. Manifest with both liquid scintillation and gamma data: disregard liquid scintillation data. If positive gamma results, explain. If not explained, categorize as radioactive. Otherwise, categorize as clean.

Table C-2. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite/data	Category
LA1035013	2	1,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	39/NO POS. γ	C
LA1035013	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	40/NO POS. γ	C
LA1035013	3	1,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	11/ ⁶⁰ Co 3.2e-05 nCi	C
LA1035014	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	13/NO POS. γ	C
LA1035014	2	1,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	16/ ¹³⁷ Cs 1.5E-05 ⁶⁰ Co 2.7E-05 nCi	C
LA1035014	4	2,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	17/ ¹³⁷ Cs 1.9E-05 nCi	C
LA1035014	14	7,290	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	20/NO POS. γ	C
LA1035014	18	9,210	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	21/NO POS. γ	C
LA1035014	2	1,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	23/NO POS. γ	C
LA1035014	12	6,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	26/NO POS. γ	C
LA1035014	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	29/NO POS. γ	C
LA1035014	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	42/NO POS. γ	C
LA1035014	3	1,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	43/NO POS. γ	C
LA1035014	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	44/NO POS. γ	C
LA1035014	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	9/NO POS. γ	C
LA1035015	1	510	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	17/ ¹³⁷ Cs 0.00019 nCi	C
LA1035015	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	18/NO POS. γ	C
LA1035015	5	2,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	19/NO POS. γ	C
LA1035015	2	1,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	25/NO POS. γ	C
LA1035015	5	2,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	28/NO POS. γ	C
LA1035015	19	9,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	29/NO POS. γ	C
LA1035015	14	8,000	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	30/NO POS. γ	C
LA1035015	3	1,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	31/NO POS. γ	C
LA1035015	6	2,990	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	33/NO POS. γ	C
LA1035015	3	1,500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	36/NO POS. γ	C
LA1035015	1	500	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	39/NO POS. γ	C
LA1163880	3	1,500	- 55 GAL. DRUM (LABORATORY CHEMICALS/WASTE NOT RCRA REGULATED)	N	BSR-87/NO POS. γ	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	MS265-D25/ ²⁰³ Hg 1.3E-02 nCi	C
LA1163976	16	9,080	- 55 GAL. DRUM (ORGANIC SOLVENTS NOT RCRA REGULATED)	N	128-89/ ²³⁵ U 5.2E-03 nCi, ¹³⁷ Cs 6.8E-03 nCi	C
LA1163982	6	3,300	- 55 GAL. DRUM (CORROSIVE LIQUIDS D002)	N	18-C1/ ¹⁴⁰ Ba 3.1E-01 nCi, ⁹⁵ Nb 3.8E-02 nCi	C
LA1208378	1	300	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS D001)	N	MS-217/ ⁵⁷ Co 1.7E-1 nCi	U
LA1208378	1	300	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS D001)	N	MS-218/SEVERAL POS. γ	C

Table C-2. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite/data	Category
LA1208378	8	2,720	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS D001, D043, D035)	N	MS-70/ ²⁰³ Hg 1.2E-02 nCi, ⁵⁴ Mn 1.6E-02 nCi	C
LA1208379	1	360	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS D001)	N	MS-71/NO POS. γ	C
LA1208379	4	1,600	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS D001, D023)	N	MS-66/NO POS. γ	C
LA1208379	2	700	- 55 GAL. DRUM (MISC. CONSTRUCTION WASTE D001, D014)	N	MS136/ ¹⁴⁴ Ce 1.7E-01 nCi	C
LA1208379	2	700	- 55 GAL. DRUM (MISC. CONSTRUCTION WASTE D001, D014)	N	MS142/SEVERAL POS. γ	C
LA1208380	24	1,680	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS D001, D035, D043)	N	MS-70/ ²⁰³ Hg 1.2E-02 nCi, ⁵⁴ Mn 1.6E-02 nCi	C
LA1208380	71	4,615	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS D001)	N	MS-71/NO POS. γ	C
LA1208380	85	5,950	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS D001, D023)	N	MS-66/NO POS. γ	C
LA1208396	9	495	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001)	N	MS50/ ²³⁵ U 6.6E-03 nCi	C
LA1208396	16	880	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001, D023)	N	MS78/ ¹⁰⁹ Cd 6.4E-01, ¹⁵⁴ Eu 6.3E-02 nCi	C
LA1208426	1	450	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS D001, F003, D035)	N	WS0193/NO POS. γ	C
LA1208427	10	4,500	- 55 GAL. DRUM (AQUEOUS WASTE D001, D018)	N	17-BE1BE2/ ²³⁵ U 7.4E-03 nCi, ¹³⁷ Cs 6.0E-03 nCi	C
LA1208429	13	6,000	- 55 GAL. DRUM (MACHINE COOLANT/OIL D001, D008)	N	BSR79/NO POS. γ	C
LA1208430	3	1,500	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003)	N	MS-173/ ⁵⁷ Co 8.2E-02 nCi, ⁶⁵ Zn 4.9E-02 nCi	C
LA1208431	1	500	- 55 GAL. DRUM (AQUEOUS WASTE D009)	N	MS-222/SEVERAL POS. γ	C
LA1208431	2	1,000	- 55 GAL. DRUM (CHLORINATED AND/OR FLUORINATED SOLVENTS F001)	N	TF9/SEVERAL POS. γ	C
LA1208431	7	3,500	- 55 GAL. DRUM (AQUEOUS WASTE D009)	N	MS/NO POS. γ	C
LA1208433	2	1,000	- 55 GAL. DRUM (CORROSIVE LIQUIDS D002)	N	MS-214/ ¹¹³ Sn 6.7E-02 nCi	C
LA1208435	1	500	- 55 GAL. DRUM (MERCURY WASTE F003, D001, D009, D018)	N	MS-155/ ¹⁰⁹ Cd 1.8E-01 nCi	C
LA1208435	1	500	- 55 GAL. DRUM (ORGANIC SOLVENTS F005, D001)	N	MS231/ ¹⁴⁴ Ce 1.7E-01 nCi, ¹⁴¹ Ce 2.0E-02 nCi; RADIOACTIVE BY PROCESS KNOWLEDGE	R
LA1208435	2	1,000	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENTS F005, D001, F003)	N	C-85/ ⁸⁵ Zr 1.8E-01 nCi	C
LA1208436	1	500	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT F005, F003, D001, D008)	N	MS-239/ ⁵⁷ Co 2.3E-01 nCi ¹¹³ Sn 8.1E-02 nCi	C
LA1208436	1	500	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT F005, F003, D001, D008)	N	MS236-3/ ⁵⁷ Co 2.7E-01 nCi, ¹³⁹ Ce 2.4E-02 nCi	C
LA1208436	1	500	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT F005, F003, D001, D008)	N	C67/SEVERAL POS. γ	C
LA1208436	1	500	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT F005, F003, D001, D008)	N	MS250/ ¹⁰⁹ Cd 4.0 E-01 nCi	C
LA1208436	1	500	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT F005, F003, D001, D008)	N	C6912/ ¹⁴¹ Ce 1.8E-02 nCi	C

Table C-2. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite/data	Category
LA1208436	1	500	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT F005, F003, D001, D008)	N	C6978/ ¹⁴⁴ Ce 1.4E-01 nCi	C
LA1208436	2	1,000	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT F005, F003, D001, D003)	N	C6713/ ⁵¹ Cr 2.2E-01 nCi	C
LA1208436	1	500	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT F005, F003, D001, D008)	N	MS-252/ ¹³¹ I 4.2E-02 nCi	C
LA1208436	1	500	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT F005, F003, D001, D008)	N	MSC6956/NO POS. γ	C
LA1208436	8	4,000	- 55 GAL. DRUM (CHLORINATED AND/OR FLUORINATED SOLVENTS F001)	N	TF-4/ ¹³⁷ Cs 8.0E-6 nCi/g, ²³⁵ U 1.0E-5 nCi/g	C
LA1208441	5	350	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D009)	N	2-A/ ⁵⁷ Co 1.7E-01 nCi	U
LA1208442	3	90	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001)	N	MS66/NO POS. γ	C
LA1208442	15	350	- 55 GAL. DRUM (MISC. CONSTRUCTION WASTE D001)	N	MS98/NO POS. γ	C
LA1208443	17	850	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001)	N	MS-70/ ²⁰³ Hg 1.0E-02 nCi, ⁵⁴ Mn 2.0E-02 nCi	C
LA1208443	6	300	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001)	N	MS-71/NO POS. γ	C
LA1208443	79	3,735	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001)	N	MS66/NO POS. γ	C
LA1208445	7	244	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001)	N	MS-71/NO POS. γ	C
LA1208446	8	2,880	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001, F003, D008, F005)	N	BSR-85/ ¹⁰⁹ Cd 5.5E-01 nCi	C
LA1208446	8	2,880	- 55 GAL. DRUM (PAINT WASTE/PAINT SOLVENT D001, F003, D008, F005)	N	BSR-107/VARIOUS POS. γ	C
NJA0307048	12	6,096	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	17/ ¹³⁷ Cs 1.9E-4 nCi/g	C
NJA0307048	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	19/NO POS. γ	C
NJA0307048	6	3,048	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	20/NO POS. γ	C
NJA0307048	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	26/NO POS. γ	C
NJA0307048	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	39/NO POS. γ	C
NJA0307048	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	40/NO POS. γ	C
NJA0307048	19	9,652	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	41/NO POS. γ	C
NJA0307048	3	1,524	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	42/NO POS. γ	C
NJA0307048	12	6,096	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	45/NO POS. γ	C
NJA0307048	3	1,544	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	46/NO POS. γ	C
NJA0307185	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	1/NO POS. γ	C
NJA0307185	4	2,032	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	10/NO POS. γ	C
NJA0307185	3	1,532	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	12/NO POS. γ	C

Table C-2. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite/data	Category
NJA0307185	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	15/ ¹³⁷ Cs 1.1E-4 nCi/g	C
NJA0307185	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	18/NO POS. γ	C
NJA0307185	3	1,532	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	19/NO POS. γ	C
NJA0307185	18	9,144	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	22/NO POS. γ	C
NJA0307185	6	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	23/NO POS. γ	C
NJA0307185	7	3,266	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	24/NO POS. γ	C
NJA0307185	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	25/NO POS. γ	C
NJA0307185	8	4,064	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	27/NO POS. γ	C
NJA0307185	3	1,524	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	28/NO POS. γ	C
NJA0307185	1	513	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	4/NO POS. γ	C
NJA0307185	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	6/NO POS. γ	C
NJA0307185	1	513	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	8/NO POS. γ	C
NJA0307186	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	41/NO POS. γ	C
NJA0307186	15	7,620	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	42/NO POS. γ	C
NJA0307186	17	8,636	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	43/NO POS. γ	C
NJA0307186	19	9,672	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	44/NO POS. γ	C
NJA0307186	8	4,064	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	45/NO POS. γ	C
NJA0307187	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	10/NO POS. γ	C
NJA0307187	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	11/ ⁶⁰ Co 3.2E-5 nCi/g	C
NJA0307187	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	16/ ¹³⁷ Cs 1.5E-5 nCi/g, ⁶⁰ Co 2.7E-5 nCi/g	C
NJA0307187	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	19/NO POS. γ	C
NJA0307187	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	23/NO POS. γ	C
NJA0307187	6	3,048	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	24/NO POS. γ	C
NJA0307187	9	4,572	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	25/NO POS. γ	C
NJA0307187	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	27/NO POS. γ	C
NJA0307187	5	2,560	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	28/NO POS. γ	C
NJA0307187	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	30/NO POS. γ	C
NJA0307187	10	5,080	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	34/NO POS. γ	C
NJA0307187	12	6,096	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	9/NO POS. γ	C
NJA0307189	9	4,578	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	10/NO POS. γ	C
NJA0307189	4	2,030	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	11/ ⁶⁰ Co 3.2E-5 nCi/g	C
NJA0307189	10	5,078	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	12/NO POS. γ	C

Table C-2. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite/data	Category
NJA0307189	7	3,556	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	13/NO POS. γ	C
NJA0307189	9	4,572	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	14/NO POS. γ	C
NJA0307189	6	3,048	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	15/ ¹³⁷ Cs 1.1E-4 nCi/g	C
NJA0307189	4	2,038	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	16/ ¹³⁷ Cs 1.5E-5 nCi/g, ⁶⁰ Co 2.7E-5 nCi/g	C
NJA0307189	3	1,525	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	2/NO POS. γ	C
NJA0307189	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	4/NO POS. γ	C
NJA0307189	5	2,547	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	6/NO POS. γ	C
NJA0307189	2	1,020	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	9/NO POS. γ	C
NJA0307190	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	1/NO POS. γ	C
NJA0307190	3	1,544	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	10/NO POS. γ	C
NJA0307190	6	3,048	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	11/ ⁶⁰ Co 3.2E-5 nCi/g	C
NJA0307190	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	12/NO POS. γ	C
NJA0307190	7	3,556	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	13/NO POS. γ	C
NJA0307190	11	5,588	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	14/NO POS. γ	C
NJA0307190	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	15/ ¹³⁷ Cs 1.1E-4 nCi/g	C
NJA0307190	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	16/ ¹³⁷ Cs 1.5E-5 nCi/g, ⁶⁰ Co 2.7E-5 nCi/g	C
NJA0307190	3	1,524	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	2/NO POS. γ	C
NJA0307190	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	4/NO POS. γ	C
NJA0307190	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	5/NO POS. γ	C
NJA0307190	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	6/NO POS. γ	C
NJA0307190	3	1,524	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	7/NO POS. γ	C
NJA0307190	3	1,524	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	8/NO POS. γ	C
NJA0307190	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	9/NO POS. γ	C
NJA0307191	3	1,531	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	11/ ⁶⁰ Co 3.2E-5 nCi/g	C
NJA0307191	3	1,530	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	13/NO POS. γ	C
NJA0307191	3	1,524	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	15/ ¹³⁷ Cs 1.1E-4 nCi/g	C
NJA0307191	18	9,144	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	18/NO POS. γ	C
NJA0307191	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	22/NO POS. γ	C
NJA0307191	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	23/NO POS. γ	C
NJA0307191	7	3,556	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	24/NO POS. γ	C
NJA0307191	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	25/NO POS. γ	C
NJA0307191	7	3,563	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	27/NO POS. γ	C

Table C-2. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite/data	Category
NJA0307191	7	3,556	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	28/NO POS. γ	C
NJA0307191	3	1,524	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	30/NO POS. γ	C
NJA0307192	1	450	- 55 GAL. DRUM (MACHINE COOLANT/OIL D001, D008, F003, F005)	Y	10/NO POS. γ	C
NJA0307192	2	900	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	11/ ⁶⁰ Co 3.2E-5 nCi/g	C
NJA0307192	4	1,800	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	19/NO POS. γ	C
NJA0307192	1	450	- 55 GAL. DRUM (MACHINE COOLANT/OIL D001, D008, F003, F005)	Y	3/NO POS. γ	C
NJA0307192	3	1,350	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	32B/NO POS. γ	C
NJA0307192	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	33/NO POS. γ	C
NJA0307192	3	1,350	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	35A/NO POS. γ	C
NJA0307192	2	900	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	36/NO POS. γ	C
NJA0307192	2	900	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	39/NO POS. γ	C
NJA0307192	2	900	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	40/NO POS. γ	C
NJA0307192	4	1,800	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	47/NO POS. γ	C
NJA0307192	3	1,350	- 55 GAL. DRUM (SAMPLES NOT RCRA REGULATED)	Y	NO DATA	LC
NJA0307192	10	4,500	- 55 GAL. DRUM (TRASH NOT RCRA REGULATED)	Y	NO DATA	LC
NJA0307197	3	1,524	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	1/NO POS. γ	C
NJA0307197	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	10/NO POS. γ	C
NJA0307197	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	13/NO POS. γ	C
NJA0307197	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	15/ ¹³⁷ Cs 1.1E-4 nCi/g	C
NJA0307197	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	2/NO POS. γ	C
NJA0307197	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	3/NO POS. γ	C
NJA0307197	8	4,064	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	4/NO POS. γ	C
NJA0307197	11	5,595	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	5/NO POS. γ	C
NJA0307197	7	3,562	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	6/NO POS. γ	C
NJA0307197	10	5,087	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	7/NO POS. γ	C
NJA0307197	4	2,032	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	8/NO POS. γ	C
NJA0307197	2	1,016	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	9/NO POS. γ	C
NJA0307198	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	1/NO POS. γ	C
NJA0307198	4	2,052	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	16/ ¹³⁷ Cs 1.5E-5, ⁶⁰ Co 2.7E-5	C
NJA0307198	9	4,572	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	2/NO POS. γ	C
NJA0307198	5	2,540	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	3/NO POS. γ	C
NJA0307198	9	4,572	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	4/NO POS. γ	C

Table C-2. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite/data	Category
NJA0307198	6	3,048	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	5/NO POS. γ	C
NJA0307198	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	6/NO POS. γ	C
NJA0307198	7	3,556	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	7/NO POS. γ	C
NJA0307198	13	6,604	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	8/NO POS. γ	C
NJA0307198	1	508	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005, D008)	Y	9/NO POS. γ	C
NJA0546927	1	400	- 55 GAL. DRUM (ORGANIC SOLVENT D001)	Y	unknown/0.00078 nCi/g ^{235}U	R
NJA0603811	9	4,653	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	Y	34/NO POS. γ	C
NJA0603811	6	3,102	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	Y	42/NO POS. γ	C
NJA0667273	10	4,500	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	N	C-52/53/ ^{235}U 7.4E-3 nCi/g	C
NJA0667273	9	4,050	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	N	C-50/ ^{235}U 5.6E-3 nCi/g, ^{137}Cs 3.6E-3 nCi/g	C
NJA0667273	8	3,600	- 55 GAL. DRUM (ORGANIC SOLVENT F001)	Y	MS-9/ ^{235}U 8.2E-3 nCi/g, ^{137}Cs 9.7E-4 nCi/g	C
NJA0667273	1	450	- 55 GAL. DRUM (ORGANIC SOLVENT F001)	Y	TF-4/ ^{137}Cs 8.0E-5 nCi/g, ^{235}U 1.0E-4 nCi/g	C
NJA0667273	22	9,900	- 55 GAL. DRUM (ORGANIC SOLVENT F001)	Y	CF-1A/B/H 5.8E-05 $\mu\text{Ci/ml}$	R
NJA0667273	15	6,750	- 55 GAL. DRUM (ORGANIC SOLVENT F001)	Y	TF-1/ ^{137}Cs 2.3E-3 nCi/g, ^{235}U 6.22E-3 nCi/g	C
NJA0667274	8	3,640	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, D008)	Y	C-64/ ^{139}Ce 1.5E-2, ^{131}I 1.5E-2	C
NJA0667274	12	5,460	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, D008)	Y	C-63/ ^{235}U 8.0E-3 nCi/g, ^{137}Cs 5.4E-3 nCi/g	C
NJA0667274	8	3,640	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, D008)	N	C-59/ ^{235}U 6.9E-3 nCi/g, ^{137}Cs 8.7E-4 nCi/g	C
NJA0667274	12	5,460	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, D008)	Y	C-58/ ^{235}U 5.4E-3 nCi/g	C
NJA0667274	12	5,460	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, D008)	Y	C-56/ ^{235}U 6.6E-3 nCi/g, ^{137}Cs 2.6E-3 nCi/g	C
NJA0667274	14	6,300	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001)	Y	MS-67/ ^{109}Cd 8.6E-02, ^{57}Co 1.9E-02	U
NJA0667274	3	1,411	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, D008)	Y	MS-82/ ^{154}Eu 3.7E-1 nCi	C
NJA0667275	12	4,800	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-108/NO POS. γ	C
NJA0667275	12	4,800	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-114/ ^{54}Mn 3.5E-02 nCi	C
NJA0667275	12	4,800	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-34/ ^{141}Ce 2.2E-2 nCi	C
NJA0667275	15	6,000	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-35/ ^{155}Eu 4.7E-02, ^{57}Co 1.9E-02, ^{141}Ce 4.8E-02	U
NJA0667275	1	400	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-36/ ^{54}Mn 2.0E-2	C
NJA0667276	8	3,200	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	Y	MC10/NO DATA FOUND	LC
NJA0667276	5	2,000	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	Y	MC11/NO DATA FOUND	LC
NJA0667276	3	1,200	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	N	MC17/ ^{235}U 5.7E-3 nCi, ^{137}Cs 3.0E-3 nCi	C

Table C-2. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite/data	Category
NJA0667276	18	7,200	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	Y	MC18/ ²³⁵ U 5.6E-3 nCi, ¹³⁷ Cs 4.1E-3 nCi	C
NJA0667276	2	800	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	N	MC7/RESULTS LOST	C
NJA0667276	4	1,600	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-108/NO POS. γ	C
NJA0667276	3	1,200	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-34/ ¹⁴¹ Ce 2.2E-2 nCi	C
NJA0667276	1	400	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-35/ ¹⁵⁵ Eu 4.7E-02 nCi, ⁵⁷ Co 1.9E-02 nCi, ¹⁴¹ Ce 4.8E-02 nCi	U
NJA0667276	1	400	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-36/ ⁵⁴ Mn 2.0E-2 nCi	C
NJA0667276	5	2,000	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	Y	UNKNOWN/NO DATA FOUND	LC
NJA0667276	3	1,200	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	N	UNKNOWN	C
NJA0667277	16	8,000	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	N	T-36/ ¹³⁷ Cs 2.3E-3 nCi/g, ²³⁵ U 6.8E-3 nCi/g	C
NJA0667277	15	7,498	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	N	T-35/ ²³⁵ U 7.1E-3 nCi/g, ¹³⁷ Cs 2.8E-3 nCi/g	C
NJA0667278	2	712	- 55 GAL. DRUM (AQUEOUS WASTE D001, D018)	Y	MS-293/ ¹³¹ I 3.2E-2 nCi	C
NJA0667278	2	1,186	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	TF-1/ ¹³⁷ Cs 2.3E-3 nCi/g, ²³⁵ U 6.22E-3 nCi/g	C
	1,628	647,117				

Table C-3 Waste items analyzed by liquid scintillation only.^a

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
60001	5	2,085	- 55 GAL. DRUM (SILVER FIXATIVE D011)	N	MS-76	C
60001	11	4,587	- 55 GAL. DRUM (SILVER FIXATIVE D011)	N	MS-65	C
60001	16	6,672	- 55 GAL. DRUM (SILVER FIXATIVE D011)	N	MS-64	C
60001	16	6,672	- 55 GAL. DRUM (SILVER FIXATIVE D011)	N	MS-63	C
60001	2	500	- 55 GAL. DRUM (SILVER FIXATIVE D011)	N	ST-1	C
AER#10482	1	6,000	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10483	1	6,000	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10484	1	5,500	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10485	1	6,000	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10486	1	6,000	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10511	1	6,000	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10512	1	6,000	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10513	1	6,000	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10514	1	6,200	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10522	1	6,200	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
AER#10523	1	1,950	TANKER TRUCK (AQUEOUS WASTE D018)	N	BSR-201	C
LA1046919	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-14	C
LA1046919	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-12	C
LA1046919	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-11	C
LA1046919	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-10	C
LA1046919	8	3,576	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-9	LC
LA1046919	8	3,576	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-6	LC
LA1046919	8	3,576	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-5	LC
LA1046919	2	688	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-4	C
LA1046919	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-3	C
LA1046919	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-1	C
LA1046920	7	2,706	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-8	LC
LA1046920	8	3,344	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-7	LC
LA1046920	8	3,144	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-2	C
LA1093838	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-20 lost doc.	LC
LA1093838	2	914	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-18	LC

a. Liquid scintillation results have been abandoned. Categorize as clean if from outside an RMMA, or likely clean, if from within an RMMA.

Table C-3. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
LA1093838	3	1,200	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-17	LC
LA1093838	4	1,753	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-16	C
LA1093838	4	1,753	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-15	C
LA1093838	8	3,600	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	N	C-13	C
LA1093838	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-8	LC
LA1093838	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-7	LC
LA1093838	2	914	- 55 GAL. DRUM (SPENT PAINT SOLVENTS F003, F005, D008, D001)	Y	C-18	LC
LA1163777	9	4,000	- 55 GAL. DRUM (LATHE COOLANT NOT RCRA REGULATED)	N	BSR79	C
LA1163880	9	4,500	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	129-ACO109	C
LA1163880	3	1,500	- 55 GAL. DRUM (LATEX PAINT NOT RCRA REGULATED)	N	BSR87	C
LA1163885	2	800	- 55 GAL. DRUM (MERCURY WASTE D009, D018)	N	D-464	C
LA1163885	1	400	- 55 GAL. DRUM (MERCURY WASTE D009)	N	D-463	C
LA1163885	2	800	- 55 GAL. DRUM (MERCURY WASTE D009)	N	D-431	C
LA1163885	3	1,200	- 55 GAL. DRUM (MERCURY WASTE D009, D018)	N	D-416/D483/D461	C
LA1163885	2	800	- 55 GAL. DRUM (MERCURY WASTE D009)	N	D-372/D408	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D33	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D36	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D38	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D329	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D34	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D43	C
LA1163885	1	400	- 55 GAL. DRUM (MERCURY WASTE D009, D018)	N	D-371	C
LA1163885	1	400	- 55 GAL. DRUM (MERCURY WASTE D009)	N	D-370	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D-297	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D-257	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D-244	C
LA1163885	2	800	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D-107	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D-106	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D23	C
LA1163885	1	400	- 55 GAL. DRUM (AQUEOUS WASTE D018)	N	D-102	C
LA1163885	36	14,400	- 55 GAL. DRUM (MERCURY WASTE D009)	N	idms	C
LA1163976	16	9,080	- 55 GAL. DRUM (ORGANIC SOLVENTS NOT RCRA REGULATED)	N	128-89	C

Table C-3. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
LA1163976	10	4,575	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	129-AC0109	C
LA1163976	9	4,125	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	130-AC1018	C
LA1163978	1	500	- 55 GAL. DRUM (LABORATORY CHEMICALS/ WASTE D002)	N	16-C3	C
LA1163982	3	1,500	- 55 GAL. DRUM (LABORATORY CHEMICALS/WASTE NOT RCRA REGULATED)	N	15-C4	C
LA1163982	6	3,300	- 55 GAL. DRUM (CORROSIVE LIQUIDS D002)	N	18-C1	C
LA1163983	2	1,000	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	16-C3	C
LA1164167	1	400	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003)	N	MS-60	C
LA1164168	1	300	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	MS-212	C
LA1164168	1	400	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, U002)	N	MS-210	C
LA1164168	4	1,400	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	MS-46	C
LA1164168	2	800	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	MS-23	C
LA1164168	1	300	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	MS-21	C
LA1164168	1	300	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	MS-3	C
LA1164168	2	800	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	N-6	C
LA1164168	1	400	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	N-5	C
LA1164168	1	350	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	N-4	C
LA1164168	1	300	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	N-3	C
LA1164168	1	400	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	N-2	C
LA1164168	1	400	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, F005)	N	N-1	C
LA1208376	2	600	- 55 GAL. DRUM (MACHINE COOLANT / OIL D008)	N	MS-141	C
LA1208376	2	875	- 55 GAL. DRUM (CORROSIVE LIQUID D007)	N	WM-6	C
LA1208376	2	500	- 55 GAL. DRUM (CORROSIVE LIQUID D010, D011)	N	WM-4	C
LA1208376	1	375	- 55 GAL. DRUM (CORROSIVE LIQUID D009)	N	WM-2	C
LA1208377	1	330	- 55 GAL. DRUM (CORROSIVE LIQUID D006, D010)	N	WM-6	C
LA1208377	3	1,250	- 55 GAL. DRUM (CORROSIVE LIQUID D001)	N	WM-5	C
LA1208377	1	320	- 55 GAL. DRUM (CORROSIVE LIQUID D010)	N	WM-3	C
LA1208378	8	2,880	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	MS-107	C
LA1208379	1	330	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, D018)	N	BE-67	C
LA1208379	1	330	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, D018)	N	BE-66	C
LA1208379	1	330	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, D018)	N	BE-65	C
LA1208379	1	330	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, D018)	N	BE-64	C
LA1208379	1	330	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, D018)	N	BE-63	C

Table C-3. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
LA1208379	1	330	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, D018)	N	BE-62	C
LA1208379	1	330	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, D018)	N	BE-61	C
LA1208387	4	1,920	- 55 GAL. DRUM (LABORATORY CHEMICALS AND WASTE D004)	N	16	C
LA1208391	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D043)	N	M-62	C
LA1208392	1	50	LAB PACK (LABORATORY CHEMICALS AND WASTE)	N	MS-260	C
LA1208426	4	1,800	- 55 GAL. DRUM (7 & 8) (PAINT WASTE AND PAINT SOLVENTS D001, F003, D008)	N	C-68	C
LA1208426	1	450	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, F003)	N	MS-207	C
LA1208426	1	450	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, F003, D035)	N	WS0200	C
LA1208427	1	450	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-12	C
LA1208427	3	1,350	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-11	C
LA1208427	2	900	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-7	C
LA1208427	3	1,350	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-6	C
LA1208427	1	450	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-5	C
LA1208427	1	450	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-4	C
LA1208427	3	1,350	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-3	C
LA1208427	2	900	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-2	C
LA1208427	2	900	- 55 GAL. DRUM (ORGANIC SOLVENT D001)	N	MS-216	C
LA1208428	1	450	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-10	C
LA1208428	1	450	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-9	C
LA1208428	1	450	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS D001, D035, F005)	N	MEK-8	C
LA1208428	1	450	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS F002, D008)	N	MT-12	C
LA1208429	1	500	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	156TPB/NPARAFIN	C
LA1208429	1	500	- 55 GAL. DRUM (LABORATORY CHEMICALS / WASTE F003, D001)	N	MS-223	C

Table C-3. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
LA1208429	1	500	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS F003, D001)	N	MS-104	C
LA1208430	1	500	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, D009, D018)	N	MS-47	C
LA1208431	1	500	- 55 GAL. DRUM (ORGANIC SOLVENTS D035, D019, F005)	N	360-677T	C
LA1208431	3	1,500	- 55 GAL. DRUM (AQUEOUS WASTE D009)	N	MS-270	C
LA1208432	2	1,000	- 55 GAL. DRUM (MACHINE COOLANT / OIL D008)	N	MC-37	C
LA1208432	6	3,000	- 55 GAL. DRUM (MACHINE COOLANT / OIL D008)	N	MC-22	C
LA1208432	1	500	- 55 GAL. DRUM (MACHINE COOLANT / OIL D008)	N	MC-20	C
LA1208432	1	500	- 55 GAL. DRUM (MACHINE COOLANT / OIL D008)	N	MC-19	C
LA1208432	1	500	- 55 GAL. DRUM (MACHINE COOLANT / OIL D008)	N	MC-24	C
LA1208432	1	500	- 55 GAL. DRUM (AQUEOUS WASTE D007, D018)	N	MS-164	C
LA1208432	1	500	- 55 GAL. DRUM (AQUEOUS WASTE D009, D018)	N	MS-163	C
LA1208432	1	500	- 55 GAL. DRUM (AQUEOUS WASTE D009, D018)	N	MS-154	C
LA1208432	1	500	- 55 GAL. DRUM (MACHINE COOLANT / OIL D008)	N	MS-23	C
LA1208433	4	2,000	- 55 GAL. DRUM (PAINT WASTE AND PAINT SOLVENTS)	N	MS-54	C
LA1208435	1	500	- 55 GAL. DRUM (ORGANIC SOLVENTS F003, D001)	N	MS-230	C
LA1208436	3	1,500	- 55 GAL. DRUM (5) (PAINT WASTE AND PAINT SOLVENTS F005, F003, D001, D008)	N	C-67	C
LA1208436	1	500	- 55 GAL. DRUM (AQUEOUS WASTE D009)	N	MS-165	C
LA1208436	8	4,000	- 55 GAL. DRUM (CHLORINATED AND/OR FLUORINATED SOLVENTS F001)	N	TF-8	C
LA1208436	3	1,500	- 55 GAL. DRUM (CHLORINATED AND/OR FLUORINATED SOLVENTS F001)	N	TF-7	C
LA1208436	8	4,000	- 55 GAL. DRUM (CHLORINATED AND/OR FLUORINATED SOLVENTS F001)	N	TF-6	C
LA1208436	8	4,000	- 55 GAL. DRUM (CHLORINATED AND/OR FLUORINATED SOLVENTS F001)	N	TF-5	C
LA1208439	4	200	LAB PACK (SOLVENT RAGS D007)	N	MS-28 IS NOT SOLVENT RAGS	C
LA1208441	5	350	LAB PACK (PAINT WASTE AND PAINT SOLVENT D009)	N	2-A	C
LA1208441	2	140	LAB PACK (ORGANIC SOLVENTS D009, D018)	N	D-413	C
LA1208442	3	90	LAB PACK (PAINT WASTE AND PAINT SOLVENTS D001)	N	MS-66	C
LA1208443	16	800	LAB PACK (PAINT WASTE AND PAINT SOLVENTS D001)	N	BSR-108	C
LA1208443	6	300	LAB PACK (PAINT WASTE AND PAINT SOLVENTS D001)	N	MS-71	C
LA1208443	17	850	LAB PACK (PAINT WASTE AND PAINT SOLVENTS D001)	N	MS-70	C
LA1208443	79	3,735	LAB PACK (PAINT WASTE AND PAINT SOLVENTS D001)	N	MS-66	C

Table C-3. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
LA1208445	22	768	LAB PACK (PAINT WASTE AND PAINT SOLVENTS D001, D018)	N	MS-117/MS97	C
LA1208445	20	700	LAB PACK (PAINT WASTE AND PAINT SOLVENT D001, D043, D007)	N	MS-116	C
LA1208446	1	400	- 55 GAL. DRUM (ORGANIC SOLVENTS D001, F003, D018, D009)	N	MS-157	C
NJA0667273	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	Y	C-51-5	LC
NJA0667273	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	Y	C-51-3	C
NJA0667273	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	Y	C-51-2	LC
NJA0667273	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	Y	C-51-4	C
NJA0667273	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	Y	C-51-7	LC
NJA0667273	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	Y	C-51-6	LC
NJA0667273	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	Y	C-51-1	LC
NJA0667273	1	450	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, F008)	Y	C-51-8	LC
NJA0667273	1	450	- 55 GAL. DRUM (ORGANIC SOLVENT F001)	Y	MS-61	LC
NJA0667274	4	1,865	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, D008)	Y	C-55	LC
NJA0667274	2	910	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, D008)	Y	C-54/H 1.3E-4 μ Ci/ml	R
NJA0667275	12	4,800	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-109	LC
NJA0667275	6	2,400	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-110	LC
NJA0667275	6	2,400	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-113	LC
NJA0667275	4	1,600	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-153	LC
NJA0667276	1	400	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	N	MC21	C
NJA0667276	3	1,200	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	Y	MC22	LC
NJA0667276	1	400	- 55 GAL. DRUM (MACHINE COOLANT D001, D008)	N	MC23	C
NJA0667276	4	1,200	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-109	LC
NJA0667276	8	3,200	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-110	LC
NJA0667276	4	1,600	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-113	LC
NJA0667276	1	400	- 55 GAL. DRUM (WASTE LONG CHAIN ALCOHOL, NOT RCRA REGULATED)	Y	MS-153	LC
NJA0667277	1	498	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	N	T-34	C
NJA0667278	1	593	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	11-24A	C

Table C-3. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Composite	Category
NJA0667278	1	593	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	11-24B	C
NJA0667278	1	593	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	11-26A	C
NJA0667278	1	593	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	11-26B	C
NJA0667278	4	1,537	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	N	C-84	C
NJA0667278	1	439	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-83-3/	C
NJA0667278	1	384	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	N	C-82-1	C
NJA0667278	1	593	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	M-29A	C
NJA0667278	2	600	- 55 GAL. DRUM (NON HAZARDOUS LIQUID WASTE)	N	MS-302	C
NJA0667278	3	900	- 55 GAL. DRUM (NON HAZARDOUS LIQUID WASTE)	N	MS-301	C
NJA0667278	2	1,186	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	MS-295	C
NJA0667278	1	500	- 55 GAL. DRUM (AQUEOUS WASTE D009, D011)	N	MS-283	C
NJA0667278	1	500	- 55 GAL. DRUM (AQUEOUS WASTE D009, D011)	N	MS-281	C
NJA0667278	4	1,412	- 55 GAL. DRUM (AQUEOUS WASTE D001, D018)	N	MS-280	C
NJA0667278	1	353	- 55 GAL. DRUM (AQUEOUS WASTE D001, D018)	N	MS-278-2	C
NJA0667278	1	353	- 55 GAL. DRUM (AQUEOUS WASTE D001, D018)	N	MS-278-4	C
NJA0667278	1	353	- 55 GAL. DRUM (AQUEOUS WASTE D001, D018)	N	MS-278-1	C
NJA0667278	1	353	- 55 GAL. DRUM (AQUEOUS WASTE D001, D018)	N	MS-278-3	C
NJA0667278	1	240	- 55 GAL. DRUM (MISC. CONSTRUCTION WASTE (SHELF LIFE) D001, D006, D007)	N	MS-122	C
NJA0667278	4	2,372	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	TF-14	C
NJA0667278	1	595	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	TF-10-3	C
NJA0667278	1	594	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	TF-10-1	C
NJA0667278	1	594	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	TF-10-2	C
NJA0667278	2	1,186	- 55 GAL. DRUM (CHLORINATED SOLVENT D008, F001)	N	TF15	C

Table C-4. Waste items analyzed by passive active neutron (PAN) analysis.

Manifest	LOG/GEN	Description	RCA	Composite	Category
IL3133781	3-66	2 LAB PACKS (LEAD OIL D008)	Y	M-29	C
IL3133781	3-74	3 LAB PACKS (LEAD OIL D008)	Y	M-29	R
IL3133781	3-74	5 LAB PACKS (LEAD OIL D008)	Y	M-29	C
IL3133781	3-85	8 LAB PACKS (LEAD OIL D008)	Y	M-29	C
IL3133781	3-102	6 LAB PACKS (LEAD OIL D008)	Y	M-29	C
IL3133781	3-109	3 LAB PACKS (LEAD OIL D008)	Y	M-29	C
IL3133781	3-131	2 LAB PACKS (1,1,1 TRICHLOROETHANE SLUDGE D008)	Y	M-29	C
IL3133781	3-131	2 LAB PACKS (1,1,1 TRICHLOROETHANE SLUDGE D008)	Y	M-29	R
IL3133781	3-132	2 LAB PACKS (LEAD OIL D008)	Y	M-29	R
IL3133781	3-132	4 LAB PACKS (LEAD OIL D008)	Y	M-29	C
IL3133781	3-138	1 LAB PACKS (1,1,1 TRICHLOROETHANE SLUDGE D008)	Y	M-29	C
IL3133781	3-74	10 LAB PACKS (LEAD OIL D008)	Y	M-27	C
IL3133781	3-94	5 LAB PACKS (LEAD OIL D008)	Y	M-27	C
IL3133781	3-101	10 LAB PACKS (LEAD OIL D008)	Y	M-27	C
IL3133781	3-102	9 LAB PACKS (LEAD OIL D008)	Y	M-27	C
IL3133781	3-109	10 LAB PACKS (LEAD OIL D008)	Y	M-27	C
IL3133781	3-125	10 LAB PACKS (LEAD OIL D008)	Y	M-27	C
IL3133781	3-140	7 LAB PACKS (LEAD OIL D008)	Y	M-27	C
IL3133781	3-66	2 LAB PACKS (LEAD OIL D008)	Y	M-26	R
IL3133781	3-74	2 LAB PACKS (LEAD OIL D008)	Y	M-26	C
IL3133781	3-85	2 LAB PACKS (LEAD OIL D008)	Y	M-26	C
IL3133781	3-94	7 LAB PACKS (LEAD OIL D008)	Y	M-26	C
IL3133781	3-102	6 LAB PACKS (LEAD OIL D008)	Y	M-26	C
IL3133781	3-109	2 LAB PACKS (LEAD OIL D008)	Y	M-26	C
IL3133781	3-125	6 LAB PACKS (LEAD OIL D008)	Y	M-26	C
IL3133781	3-132	5 LAB PACKS (LEAD OIL D008)	Y	M-26	C
IL3133781	3-140	7 LAB PACKS (LEAD OIL D008)	Y	M-26	C
IL3133781	3-66	11 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL3133781	3-67	8 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL3133781	3-74	8 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL3133781	3-78	3 LAB PACKS (LEAD OIL D008)	Y	M-25	R
IL3133781	3-94	6 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL3133781	3-101	3 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL3133781	3-102	3 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL3133781	3-125	5 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL3133781	3-132	6 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL3133781	3-67	2 LAB PACKS (LEAD OIL D008)	Y	M-24	C
IL3133781	3-67	2 LAB PACKS (LEAD OIL D008)	Y	M-24	C
IL3133781	3-94	6 LAB PACKS (LEAD OIL D008)	Y	M-24	C
IL3133781	3-101	4 LAB PACKS (LEAD OIL D008)	Y	M-24	C
IL3133781	3-102	2 LAB PACKS (LEAD OIL D008)	Y	M-24	C

Table C-4. (continued).

Manifest	LOG/GEN	Description	RCA	Composite	Category
IL3133781	3-109	16 LAB PACKS (LEAD OIL D008)	Y	M-24	C
IL3133781	3-125	5 LAB PACKS (LEAD OIL D008)	Y	M-24	C
IL3133781	3-132	14 LAB PACKS (LEAD OIL D008)	Y	M-24	C
IL3133781	3-140	2 LAB PACKS (LEAD OIL D008)	Y	M-24	C
IL3133799	3-53	3 LAB PACKS (LEAD OIL D008)	Y	M-42	C
IL3133799	3-66	4 LAB PACKS (LEAD OIL D008)	Y	M-42	C
IL3133799	3-74	18 LAB PACKS (LEAD OIL D008)	Y	M-42	C
IL3133799	3-109	1 LAB PACKS (LEAD OIL D008)	Y	M-42	C
IL3133799	3-182	1 LAB PACKS (LEAD OIL D008)	Y	M-42	C
IL3133799	3-53	5 LAB PACKS (LEAD OIL D008)	Y	M-41	C
IL3133799	3-58	2 LAB PACKS (LEAD OIL D008)	Y	M-41	C
IL3133799	3-66	1 LAB PACKS (LEAD OIL D008)	Y	M-41	C
IL3133799	3-74	12 LAB PACKS (LEAD OIL D008)	Y	M-41	C
IL3133799	3-94	1 LAB PACKS (LEAD OIL D008)	Y	M-41	C
IL3133799	3-122	2 LAB PACKS (LEAD OIL D008)	Y	M-41	C
IL3133799	3-53	3 LAB PACKS (LEAD OIL D008)	Y	M-40	C
IL3133799	3-58	8 LAB PACKS (LEAD OIL D008)	Y	M-40	C
IL3133799	3-74	4 LAB PACKS (LEAD OIL D008)	Y	M-40	C
IL3133799	3-102	2 LAB PACKS (LEAD OIL D008)	Y	M-40	C
IL3133799	3-122	10 LAB PACKS (LEAD OIL D008)	Y	M-40	C
IL3133799	3-132	1 LAB PACKS (LEAD OIL D008)	Y	M-40	C
IL3133799	3-53	2 LAB PACKS (LEAD OIL D008)	Y	M-39	C
IL3133799	3-58	2 LAB PACKS (LEAD OIL D008)	Y	M-39	C
IL3133799	3-74	11 LAB PACKS (LEAD OIL D008)	Y	M-39	C
IL3133799	3-94	2 LAB PACKS (LEAD OIL D008)	Y	M-39	C
IL3133799	3-102	1 LAB PACKS (LEAD OIL D008)	Y	M-39	C
IL3133799	3-109	2 LAB PACKS (LEAD OIL D008)	Y	M-39	C
IL3133799	3-122	7 LAB PACKS (LEAD OIL D008)	Y	M-39	C
IL3133799	3-132	4 LAB PACKS (LEAD OIL D008)	Y	M-39	C
IL3133799	3-35	5 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-29	C
IL3133799	3-52	5 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-29	C
IL3133799	3-55	6 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-29	C
IL3133799	3-35	3 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-28	C
IL3133799	3-40	2 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-28	C
IL3133799	3-52	5 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-28	C
IL3133799	3-55	8 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-28	C
IL3133799	3-58	1 LAB PACKS (LEAD OIL D008)	Y	T-28	C
IL3133799	3-80	4 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-28	C
IL3133799	3-102	1 LAB PACKS (LEAD OIL D008)	Y	T-28	C
IL3133799	3-35	4 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-27	C

Table C-4. (continued).

Manifest	LOG/GEN	Description	RCA	Composite	Category
IL3133799	3-40	1 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-27	C
IL3133799	3-52	6 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-27	C
IL3133799	3-55	10 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-27	C
IL3133799	3-75	2 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-27	C
IL3133799	3-80	4 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-27	C
IL3133799	3-35	10 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-26	C
IL3133799	3-40	1 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-26	C
IL3133799	3-52	2 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-26	C
IL3133799	3-55	10 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-26	C
IL3133799	3-75	3 LAB PACKS (1,1,1 TRICHLOROETHANE F001)	Y	T-26	C
IL4003242	3-54	2 LAB PACKS (LEAD OIL D008)	Y	M-37	C
IL4003242	3-58	1 LAB PACKS (LEAD OIL D008)	Y	M-37	R
IL4003242	3-58	3 LAB PACKS (LEAD OIL D008)	Y	M-37	C
IL4003242	3-66	1 LAB PACKS (LEAD OIL D008)	Y	M-37	C
IL4003242	3-102	1 LAB PACKS (LEAD OIL D008)	Y	M-37	C
IL4003242	3-58	1 LAB PACKS (LEAD OIL D008)	Y	M-36	R
IL4003242	3-58	3 LAB PACKS (LEAD OIL D008)	Y	M-36	C
IL4003242	3-66	3 LAB PACKS (LEAD OIL D008)	Y	M-36	C
IL4003242	3-78	4 LAB PACKS (LEAD OIL D008)	Y	M-36	C
IL4003242	3-94	9 LAB PACKS (LEAD OIL D008)	Y	M-36	C
IL4003242	3-102	3 LAB PACKS (LEAD OIL D008)	Y	M-36	C
IL4003242	3-140	8 LAB PACKS (LEAD OIL D008)	Y	M-36	C
IL4003242	3-54	2 LAB PACKS (LEAD OIL D008)	Y	M-35	C
IL4003242	3-58	1 LAB PACKS (LEAD OIL D008)	Y	M-35	R
IL4003242	3-58	7 LAB PACKS (LEAD OIL D008)	Y	M-35	C
IL4003242	3-66	4 LAB PACKS (LEAD OIL D008)	Y	M-35	C
IL4003242	3-66	1 LAB PACKS (LEAD OIL D008)	Y	M-35	R
IL4003242	3-78	5 LAB PACKS (LEAD OIL D008)	Y	M-35	C
IL4003242	3-94	5 LAB PACKS (LEAD OIL D008)	Y	M-35	C
IL4003242	3-125	2 LAB PACKS (LEAD OIL D008)	Y	M-35	C
IL4003242	3-132	1 LAB PACKS (LEAD OIL D008)	Y	M-35	C
IL4003242	3-140	2 LAB PACKS (LEAD OIL D008)	Y	M-35	C
IL4003242	3-58	2 LAB PACKS (LEAD OIL D008)	Y	M-34	R
IL4003242	3-58	10 LAB PACKS (LEAD OIL D008)	Y	M-34	C
IL4003242	3-66	1 LAB PACKS (LEAD OIL D008)	Y	M-34	R
IL4003242	3-66	4 LAB PACKS (LEAD OIL D008)	Y	M-34	C
IL4003242	3-74	3 LAB PACKS (LEAD OIL D008)	Y	M-34	C
IL4003242	3-78	1 LAB PACKS (LEAD OIL D008)	Y	M-34	C
IL4003242	3-94	7 LAB PACKS (LEAD OIL D008)	Y	M-34	C
IL4003242	3-132	2 LAB PACKS (LEAD OIL D008)	Y	M-34	C

Table C-4. (continued).

Manifest	LOG/GEN	Description	RCA	Composite	Category
IL4003242	3-53	3 LAB PACKS (LEAD OIL D008)	Y	M-33	C
IL4003242	3-66	2 LAB PACKS (LEAD OIL D008)	Y	M-33	C
IL4003242	3-67	2 LAB PACKS (LEAD OIL D008)	Y	M-33	C
IL4003242	3-74	1 LAB PACKS (LEAD OIL D008)	Y	M-33	C
IL4003242	3-78	2 LAB PACKS (LEAD OIL D008)	Y	M-33	C
IL4003242	3-94	3 LAB PACKS (LEAD OIL D008)	Y	M-33	C
IL4003242	3-132	8 LAB PACKS (LEAD OIL D008)	Y	M-33	C
IL4003242	3-53	8 LAB PACKS (LEAD OIL D008)	Y	M-32	C
IL4003242	3-58	2 LAB PACKS (LEAD OIL D008)	Y	M-32	C
IL4003242	3-66	3 LAB PACKS (LEAD OIL D008)	Y	M-32	C
IL4003242	3-67	1 LAB PACKS (LEAD OIL D008)	Y	M-32	C
IL4003242	3-74	1 LAB PACKS (LEAD OIL D008)	Y	M-32	C
IL4003242	3-78	2 LAB PACKS (LEAD OIL D008)	Y	M-32	C
IL4003242	3-94	9 LAB PACKS (LEAD OIL D008)	Y	M-32	C
IL4003242	3-102	1 LAB PACKS (LEAD OIL D008)	Y	M-32	C
IL4003242	3-132	3 LAB PACKS (LEAD OIL D008)	Y	M-32	C
IL4003242	3-53	3 LAB PACKS (LEAD OIL D008)	Y	M-31	C
IL4003242	3-58	6 LAB PACKS (LEAD OIL D008)	Y	M-31	C
IL4003242	3-67	1 LAB PACKS (LEAD OIL D008)	Y	M-31	C
IL4003242	3-74	2 LAB PACKS (LEAD OIL D008)	Y	M-31	R
IL4003242	3-74	5 LAB PACKS (LEAD OIL D008)	Y	M-31	C
IL4003242	3-78	3 LAB PACKS (LEAD OIL D008)	Y	M-31	C
IL4003242	3-94	2 LAB PACKS (LEAD OIL D008)	Y	M-31	C
IL4003242	3-102	6 LAB PACKS (LEAD OIL D008)	Y	M-31	C
IL4003242	3-132	1 LAB PACKS (LEAD OIL D008)	Y	M-31	C
IL4003242	3-58	1 LAB PACKS (LEAD OIL D008)	Y	M-27	C
IL4003242	3-58	5 LAB PACKS (LEAD OIL D008)	Y	M-27	R
IL4003242	3-58	5 LAB PACKS (LEAD OIL D008)	Y	M-26	C
IL4003242	3-58	3 LAB PACKS (LEAD OIL D008)	Y	M-26	R
IL4003242	3-53	1 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL4003242	3-58	2 LAB PACKS (LEAD OIL D008)	Y	M-25	R
IL4003242	3-58	9 LAB PACKS (LEAD OIL D008)	Y	M-25	C
IL4003242	3-58	5 LAB PACKS (LEAD OIL D008)	Y	M-24	C
IL4003242	3-58	2 LAB PACKS (LEAD OIL D008)	Y	M-24	R
IL4003242	3-67	2 LAB PACKS (LEAD OIL D008)	Y	M-25	C

Table C-5. Drums of lead oil waste with positive PAN results above the detection limit.

Manifest	RES drum number	CWM drum numbers	Composite	Shipment date	Assay date	Uranium content (g)
IL4003242	299	237;238	M-24	6/12/89	3/16/89	0.51
IL3133781	440	173;174;175	M-25	6/5/89	3/17/89	0.10
IL4003242	428	225;226	M-25	6/12/89	3/17/89	0.12
IL4003242	319	90;91	M-26	6/12/89	3/17/89	0.46
IL3133781	524	86;87	M-26	6/5/89	3/17/89	1.30
IL4003242	431	26	M-26	6/12/89	3/17/89	0.10
IL4003242	298	108;109	M-27	6/12/89	3/17/89	0.20
IL4003242	357	31;32;33	M-27	6/12/89	3/17/89	2.78
IL3133781	250	146;147	M-29	6/5/89	3/20/89	0.12
IL3133781	58	135;136;137	M-29	6/5/89	3/20/89	0.20
IL3133781	3	163;164	M-29	6/5/89	3/20/89	0.18
IL4003242	329	315	M-31	6/12/89	6/5/89	0.09
IL4003242	327	356	M-31	6/12/89	6/5/89	0.09
IL4003242	407	382	M-34	6/12/89	6/6/89	0.06
IL4003242	354	396	M-34	6/12/89	6/6/89	0.17
IL4003242	354	395	M-34	6/12/89	6/6/89	0.29
IL4003242	407	383	M-35	6/12/89	6/6/89	0.09
IL4003242	321	466	M-35	6/12/89	6/6/89	0.11
IL4003242	321	465	M-36	6/12/89	6/7/89	0.23
IL4003242	321	467	M-37	6/12/89	6/7/89	0.12

Table C-6. Waste items released by health physics certification or blue tag.^a

Manifest	Number of drums	Weight (lb)	Description	RCA	Release procedure/other information	Category
00275215	1	89 KG	- 55 GAL. DRUM (PCBs (CONTAMINATED RAGS AND DIRT) NOT RCRA REGULATED)	Y	HP APPROVAL PER SURVEY	C
00275216	9	2,097 KG	- 55 GAL. DRUM (PCBs (CONTAMINATED LIGHT BALLAST) NOT RCRA REGULATED)	Y	HP APPROVAL PER SURVEY	C
00285327	1	36 KG	- 55 GAL. DRUM (PCBS (CONTAMINATED ISOCTANE & HEXANE))	N	HP BLUE TAG	C
00285328	1	45 KG	- 55 GAL. DRUM (PCBs (CONTAMINATED RAGS) NOT RCRA REGULATED)	Y	HP APPROVAL PER SURVEY	C
00285328	1	191 KG	- 55 GAL. DRUM (PCBs (CONTAMINATED DIRT) NOT RCRA REGULATED)	Y	HP APPROVAL PER SURVEY	C
00285329	1	100 LG	- 55 GAL. DRUM (PCBS (CONTAMINATED TRANSFORMER OIL) NOT RCRA REGULATED)	Y	HP APPROVAL PER SURVEY	C
00285331	9	2,658 KG	- 55 GAL. DRUM (PCBS (CONTAMINATED LIGHT BALLAST) NOT RCRA REGULATED)	Y	HP APPROVAL PER SURVEY	C
30002	5	750	- 55 GAL. DRUM (CHLORINATED SOLVENT F001)	Y	LOST DOCUMENTATION/POTENTIAL U-235	LR
60001	2	834	- 55 GAL. DRUM (SILVER FIXATIVE D011)	N	HP CLEARED PER DPSOL 709G-13. NO ANALYTICAL DATA AVAILABLE	C
AER#00959	1	350	TANKER TRUCK (UNOPENED CONTAINERS OF ETHYL ETHER D001)	Y	HP APPROVAL DPSOL 709G-13	C
AER#01009	1	41	LAB PACK (EMPTIED CONTAINERS OF ETHYL ETHER D001)	Y	HP APPROVAL DPSOL 709G-13	C
AER#01030	1	200	TANKER TRUCK (UNOPENED CONTAINERS OF ETHYL ETHER AND PICRIC ACID D001)	Y	LU DLUM HP210/<80d/m BETA GAMMA <10d/m ALPHA	C
CWMA487415	157	9,430	- 55 GAL. DRUM (CRUSHED DRUMS)	Y	HP GREEN TAG	C
IL2093348	41	7,978	- 55 GAL. DRUM (LEAD OIL SOLID D008)	Y	HP GREEN TAG/POTENTIAL ²³⁵ U	LR
IL2093348	23	4,462	- 55 GAL. DRUM (LEAD OIL SOLID D008)	Y	LOST DOCUMENTATION/POTENTIAL ²³⁵ U	LR
IL3133781	13	UNK.	- LAB PACKS (CLEAN UP DEBRIS NOT RCRA REGULATED)	Y	LOST DOCUMENTATION/POTENTIAL ²³⁵ U	LR
LA1163777	1	50	LAB PACK (LABORATORY CHEMICALS/WASTE NOT RCRA REGULATED)	N	NO DATA	C
LA1163777	9	4,500	- 55 GAL. DRUM (LABORATORY CHEMICALS/WASTE NOT RCRA REGULATED)	N	NO DATA	C
LA1163880	1	80	LAB PACK (LABORATORY CHEMICALS/ WASTE D001)	N	HP CLEARANCE	C
LA1163880	1	5	LAB PACK (LABORATORY CHEMICALS/ WASTE P106, P098)	N	HP CLEARANCE	C
LA1163880	6	3,000	- 55 GAL. DRUM (LABORATORY CHEMICALS/WASTE NOT RCRA REGULATED)	N	NO DATA	C
LA1163880	9	4,500	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	NO DATA	C
LA1163882	3	6	LAB PACK (ORGANIC SOLVENTS D001)	N	HP TAG	C
LA1163882	8	16	LAB PACK (ORGANIC SOLVENTS U117, D001)	N	HP TAG	C

a. Waste released by health physics certification is categorized clean if the HP survey complies with DOE Order 5400.5 guidelines..

Table C-6. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Release procedure/other information	Category
LA1163883	1	11	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D003)	N	HP TAG	C
LA1163883	1	15	LAB PACK (LABORATORY CHEMICALS AND WASTE U080, U044, D022, U122, U209)	N	HP TAG	C
LA1163883	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1163883	1	15	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U056)	N	HP TAG	C
LA1163884	20	1,170	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1163910	2	54	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U154, U019, D018)	N	HP TAG	C
LA1163910	4	108	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U213)	N	HP TAG	C
LA1163910	1	27	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U019, D018)	N	HP TAG	C
LA1163910	2	54	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U154)	N	HP TAG	C
LA1163912	1	27	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U154)	N	HP TAG	C
LA1163912	1	20	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U161, U220, U108)	N	HP TAG	C
LA1163912	1	27	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U140, U078, D029)	N	HP TAG	C
LA1163912	1	27	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U056)	N	HP TAG	C
LA1163913	1	40	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1163913	2	80	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1163913	1	25	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U031, U213)	N	HP TAG	C
LA1163913	1	40	LAB PACK (LABORATORY CHEMICALS AND WASTE U002, D001)	N	HP TAG	C
LA1163914	1	25	LAB PACK (LABORATORY CHEMICALS AND WASTE D002)	N	HP TAG	C
LA1163914	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1163914	5	240	LAB PACK (LABORATORY CHEMICALS AND WASTE D002, U134)	N	HP TAG	C
LA1163915	1	24	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U213, U108)	N	HP TAG	C
LA1163915	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE U169, D036)	N	HP TAG	C
LA1163915	2	22	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1163916	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D006, D009, D011)	N	HP TAG	C
LA1163916	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D009, D005)	N	HP TAG	C
LA1163916	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1163916	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE P098, D003)	N	HP TAG	C
LA1163917	3	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1163917	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D002)	N	HP TAG	C
LA1163918	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1163918	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D011, D006, D005, D008)	N	HP TAG	C
LA1163918	1	10	LAB PACK (LABORATORY CHEMICALS/WASTE NOT RCRA REGULATED)	N	HP TAG	C
LA1163918	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D010, D006, D005, D008)	N	HP TAG	C
LA1163919	4	185	LAB PACK (LABORATORY CHEMICALS AND WASTE D002)	N	HP TAG	C

Table C-6. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Release procedure/other information	Category
LA1163920	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D007)	N	HP TAG	C
LA1163920	3	120	LAB PACK (LABORATORY CHEMICALS AND WASTE D002)	N	HP TAG	C
LA1163920	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE U188)	N	HP TAG	C
LA1163921	1	10	LAB PACK (LABORATORY CHEMICALS/WASTE NOT RCRA REGULATED)	N	HP TAG	C
LA1163921	1	15	LAB PACK (LABORATORY CHEMICALS AND WASTE P106, P098, D003)	N	HP TAG	C
LA1163921	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE U147)	N	HP TAG	C
LA1163921	1	40	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D002)	N	HP TAG	C
LA1163976	1	25	LAB PACK (CORROSIVE LIQUID D002)	N	HP cert.	C
LA1163976	1	450	- 55 GAL. DRUM (ORGANIC SOLVENTS D001)	N	HP cert.	C
LA1163976	6	240	LAB PACK (LABORATORY CHEMICALS/WASTE NOT RCRA REGULATED)	N	HP cert.	C
LA1163977	1	3	LAB PACK (LABORATORY CHEMICALS/ WASTE D001)	N	HP cert.	C
LA1163977	6	11	LAB PACK (LABORATORY CHEMICALS/ WASTE D001)	N	HP cert.	C
LA1163977	1	24	LAB PACK (LABORATORY CHEMICALS/ WASTE U077)	N	HP cert.	C
LA1163977	1	30	LAB PACK (LABORATORY CHEMICALS/ WASTE NOT RCRA REGULATED)	N	HP cert.	C
LA1163978	1	2	LAB PACK (LABORATORY CHEMICALS/ WASTE D001)	N	HP cert.	C
LA1163978	1	3	LAB PACK (LABORATORY CHEMICALS/ WASTE D001, D003)	N	HP cert.	C
LA1163979	1	15	LAB PACK (LABORATORY CHEMICALS/ WASTE D011)	N	HP cert.	C
LA1163979	20	1,000	LAB PACK (LABORATORY CHEMICALS/ WASTE NOT RCRA REGULATED)	N	HP cert.	C
LA1163979	9	216	LAB PACK (LABORATORY CHEMICALS/ WASTE D002)	N	HP cert.	C
LA1163980	6	63	LAB PACK (LABORATORY CHEMICALS/ WASTE D001)	N	HP cert.	C
LA1163980	36	864	LAB PACK (LABORATORY CHEMICALS/ WASTE U056)	N	HP cert.	C
LA1163981	1	40	LAB PACK (LABORATORY CHEMICALS/ WASTE U211)	N	HP cert.	C
LA1163981	1	24	LAB PACK (LABORATORY CHEMICALS/ WASTE D001, U161)	N	HP cert.	C
LA1163981	6	144	LAB PACK (LABORATORY CHEMICALS/ WASTE D001, U002, U161)	N	HP cert.	C
LA1163981	1	40	LAB PACK (LABORATORY CHEMICALS/ WASTE U226)	N	HP cert.	C
LA1163982	7	350	LAB PACK (LABORATORY CHEMICALS/ WASTE NOT RCRA REGULATED)	N	HP cert.	C
LA1163983	22	838	LAB PACK (LABORATORY CHEMICALS/ WASTE D001)	N	HP cert.	C
LA1163983	2	80	LAB PACK (LABORATORY CHEMICALS/ WASTE D002)	N	HP cert.	C
LA1163983	4	80	LAB PACK (LABORATORY CHEMICALS/ WASTE D007)	N	HP cert.	C
LA1163984	15	600	LAB PACK (LABORATORY CHEMICALS/ WASTE D001)	N	HP cert.	C
LA1163984	2	50	LAB PACK (LABORATORY CHEMICALS/ WASTE D002)	N	HP cert.	C
LA1163984	37	1,587	LAB PACK (LABORATORY CHEMICALS/ WASTE NOT RCRA REGULATED)	N	HP cert.	C
LA1163984	5	250	LAB PACK (LABORATORY CHEMICALS/ WASTE D002)	N	HP cert.	C
LA1163985	1	6	LAB PACK (LABORATORY CHEMICALS/ WASTE D005, D008, D009)	N	HP cert.	C

Table C-6. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Release procedure/other information	Category
LA1163985	64	5,534	LAB PACK (LABORATORY CHEMICALS/ WASTE D002)	N	HP cert.	C
LA1164160	3	36	LAB PACK (LABORATORY CHEMICALS/WASTE D002)	N	HP TAG	C
LA1164160	6	78	LAB PACK (LABORATORY CHEMICALS/WASTE D001, D005)	N	HP TAG	C
LA1164160	2	60	LAB PACK (LABORATORY CHEMICALS/WASTE D001)	N	HP TAG	C
LA1164160	11	168	LAB PACK (LABORATORY CHEMICALS/WASTE D001, F003, U161, U159 U031, U239, U002, U154)	N	HP TAG	C
LA1164161	1	28	LAB PACK (LABORATORY CHEMICALS/WASTE D007)	N	HP TAG	C
LA1164161	2	133	LAB PACK (LABORATORY CHEMICALS/WASTE U165, U211, U122, U080)	N	HP TAG	C
LA1164161	1	26	LAB PACK (LABORATORY CHEMICALS/WASTE D006, D005, D008, D007)	N	HP TAG	C
LA1164161	7	190	LAB PACK (LABORATORY CHEMICALS/WASTE D002)	N	HP TAG	C
LA1164162	1	25	LAB PACK (LABORATORY CHEMICALS/WASTE D007)	N	HP TAG	C
LA1164162	1	22	LAB PACK (LABORATORY CHEMICALS/WASTE D001, D007, D008, D009, D011, D006)	N	HP TAG	C
LA1164162	1	13	LAB PACK (LABORATORY CHEMICALS/WASTE U188, U170)	N	HP TAG	C
LA1164162	1	18	LAB PACK (LABORATORY CHEMICALS/WASTE D009, D004)	N	HP TAG	C
LA1164163	1	40	LAB PACK (LABORATORY CHEMICALS/WASTE D001, U220)	N	HP TAG	C
LA1164163	3	27	LAB PACK (LABORATORY CHEMICALS/WASTE D001)	N	HP TAG	C
LA1164164	4	96	LAB PACK (LABORATORY CHEMICALS/WASTE D001, U154, U080)	N	HP TAG	C
LA1164164	1	10	LAB PACK (LABORATORY CHEMICALS/WASTE D001, D003)	N	HP TAG	C
LA1164164	11	85	LAB PACK (LABORATORY CHEMICALS/WASTE D001)	N	HP TAG	C
LA1164165	3	85	LAB PACK (LABORATORY CHEMICALS/WASTE D001, U220)	N	HP TAG	C
LA1164165	1	8	LAB PACK (LABORATORY CHEMICALS/WASTE D001)	N	HP TAG	C
LA1164165	1	32	LAB PACK (LABORATORY CHEMICALS/WASTE U165)	N	HP TAG	C
LA1164165	1	10	LAB PACK (LABORATORY CHEMICALS/WASTE D002)	N	HP TAG	C
LA1164166	1	17	LAB PACK (LABORATORY CHEMICALS/WASTE U169)	N	HP TAG	C
LA1164166	3	24	LAB PACK (LABORATORY CHEMICALS/WASTE D002)	N	HP TAG	C
LA1164166	3	36	LAB PACK (LABORATORY CHEMICALS/WASTE D001)	N	HP TAG	C
LA1164167	1	12	LAB PACK (LABORATORY CHEMICALS/WASTE D001)	N	HP TAG	C
LA1164167	3	3	LAB PACK (LABORATORY CHEMICALS/WASTE D002)	N	HP TAG	C
LA1164167	1	7	LAB PACK (LABORATORY CHEMICALS/WASTE D007)	N	HP TAG	C
LA1164168	2	18	LAB PACK (LABORATORY CHEMICALS / WASTE NOT RCRA REGULATED)	N	HP TAG	C
LA1164169	5	165	LAB PACK (LABORATORY CHEMICALS / WASTE NOT RCRA REGULATED)	N	HP TAG	C
LA1164169	1	9	LAB PACK (LABORATORY CHEMICALS/ WASTE D003, P106)	N	HP TAG	C
LA1164169	1	10	LAB PACK (LABORATORY CHEMICALS / WASTE NOT RCRA REGULATED)	N	HP TAG	C
LA1164170	31	1,585	LAB PACK (LABORATORY CHEMICALS / WASTE NOT RCRA REGULATED)	N	HP TAG	C

Table C-6. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Release procedure/other information	Category
LA1208381	17	610	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208381	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D035)	N	HP BLUE TAG	C
LA1208382	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D035)	N	HP BLUE TAG	C
LA1208382	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208382	77	4,270	LAB PACK (LABORATORY CHEMICALS AND WASTE D002)	N	HP BLUE TAG	C
LA1208382	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D008)	N	HP BLUE TAG	C
LA1208383	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, F003, F005, D009)	N	HP BLUE TAG	C
LA1208383	1	25	LAB PACK (LABORATORY CHEMICALS AND WASTE D009, D007, D011, F005)	N	HP BLUE TAG	C
LA1208383	3	120	LAB PACK (LABORATORY CHEMICALS AND WASTE NOT RCRA REGULATED)	N	HP BLUE TAG	C
LA1208384	1	52	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208384	20	975	LAB PACK (LABORATORY CHEMICALS AND WASTE NOT RCRA REGULATED)	N	HP BLUE TAG	C
LA1208385	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D007)	N	HP BLUE TAG	C
LA1208385	9	495	LAB PACK (LABORATORY CHEMICALS AND WASTE D008)	N	HP BLUE TAG	C
LA1208385	2	220	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208385	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D010)	N	HP BLUE TAG	C
LA1208386	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D006, D008)	N	HP BLUE TAG	C
LA1208386	2	20	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D007)	N	HP BLUE TAG	C
LA1208386	1	70	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208386	1	15	LAB PACK (LABORATORY CHEMICALS AND WASTE D008)	N	HP BLUE TAG	C
LA1208387	1	15	LAB PACK (LABORATORY CHEMICALS AND WASTE D004, D009)	N	HP BLUE TAG	C
LA1208387	1	34	LAB PACK (LABORATORY CHEMICALS AND WASTE NOT RCRA REGULATED)	N	HP BLUE TAG	C
LA1208387	5	250	LAB PACK (LABORATORY CHEMICALS AND WASTE NOT RCRA REGULATED)	N	HP BLUE TAG	C
LA1208388	1	25	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, F005, D008, D007)	N	HP BLUE TAG	C
LA1208388	71	2,130	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D008, D035, D007)	N	HP BLUE TAG	C
LA1208388	2	50	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, F005, F003)	N	HP BLUE TAG	C
LA1208388	1	20	LAB PACK (LABORATORY CHEMICALS AND WASTE U165)	N	HP BLUE TAG	C
LA1208389	2	50	LAB PACK (LABORATORY CHEMICALS AND WASTE D004, D011)	N	HP BLUE TAG	C
LA1208389	33	730	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208389	1	15	LAB PACK (LABORATORY CHEMICALS AND WASTE P098, P106)	N	HP BLUE TAG	C
LA1208390	45	1,470	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208390	13	410	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208390	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE P120)	N	HP BLUE TAG	C
LA1208390	4	200	LAB PACK (LABORATORY CHEMICALS AND WASTE D008)	N	HP BLUE TAG	C
LA1208391	2	93	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U003)	N	HP BLUE TAG	C

Table C-6. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Release procedure/other information	Category
LA1208391	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D035)	N	HP BLUE TAG	C
LA1208392	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208392	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D004, P115)	N	HP BLUE TAG	C
LA1208393	1	15	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D035)	N	HP BLUE TAG	C
LA1208393	1	15	LAB PACK (LABORATORY CHEMICALS AND WASTE D014)	N	HP BLUE TAG	C
LA1208393	1	15	LAB PACK (LABORATORY CHEMICALS AND WASTE D004)	N	HP BLUE TAG	C
LA1208394	3	100	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208394	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U162)	N	HP BLUE TAG	C
LA1208394	1	50	LAB PACK (LABORATORY CHEMICALS AND WASTE U228, U080)	N	HP BLUE TAG	C
LA1208395	20	1,000	LAB PACK (SOLVENT RAGS F001)	N	HP BLUE TAG	C
LA1208395	1	20	LAB PACK (LABORATORY CHEMICALS AND WASTE D002)	N	HP BLUE TAG	C
LA1208395	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D002)	N	HP BLUE TAG	C
LA1208395	5	250	LAB PACK (SOLVENT RAGS F001)	N	HP BLUE TAG	C
LA1208395	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208396	28	1,400	LAB PACK (SOLVENT RAGS F001, F005, D035)	N	HP BLUE TAG	C
LA1208397	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE F005, F003, D001, F001, D008)	N	HP BLUE TAG	C
LA1208397	2	20	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP BLUE TAG	C
LA1208397	4	100	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D005)	N	HP BLUE TAG	C
LA1208397	1	25	LAB PACK (LABORATORY CHEMICALS AND WASTE F005, D001, F002)	N	HP BLUE TAG	C
LA1208437	1	3	LAB PACK (LABORATORY CHEMICALS / WASTES D001)	N	HP TAG	C
LA1208437	1	5	LAB PACK (LABORATORY CHEMICALS / WASTE NOT RCRA REGULATED)	N	HP TAG	C
LA1208437	1	7	LAB PACK (LABORATORY CHEMICALS / WASTES D007)	N	HP TAG	C
LA1208437	6	240	LAB PACK (LABORATORY CHEMICALS / WASTES NOT RCRA REGULATED)	N	HP TAG	C
LA1208438	7	140	LAB PACK (LABORATORY CHEMICALS / WASTES D001, U077, D028)	N	HP TAG	C
LA1208438	6	240	LAB PACK (LABORATORY CHEMICALS / WASTES D001)	N	HP TAG	C
LA1208438	1	1	LAB PACK (LABORATORY CHEMICALS / WASTES D002)	N	HP TAG	C
LA1208439	36	1,800	LAB PACK (SOLVENT RAGS F005)	N	HP Certification	C
LA1208439	31	1,550	LAB PACK (SOLVENT RAGS F001)	N	HP Certification	C
LA1208440	1	3	LAB PACK (LABORATORY CHEMICALS / WASTES D001)	N	HP TAG	C
LA1208440	1	30	LAB PACK (LABORATORY CHEMICALS / WASTES D001, U160)	N	HP TAG	C
LA1208441	24	1,200	LAB PACK (SOLVENT RAGS F001)	N	HP Certification	C
LA1208441	3	210	LAB PACK (MERCURY WASTE D009, D018)	N	HP Certification	C
LA1208441	42	2,100	LAB PACK (SOLVENT RAGS F001)	N	HP Certification	C
LA1208444	3	30	LAB PACK (LABORATORY WASTE AND CHEMICALS D001)	N	HP TAG	C

Table C-6. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Release procedure/other information	Category
LA1208446	46	1,720	LAB PACK (LABORATORY CHEMICALS / WASTE NOT RCRA REGULATED)	N	HP TAG	C
LA1208447	4	40	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1208448	2	20	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
LA1208448	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D009)	N	HP TAG	C
LA1208448	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D007)	N	HP TAG	C
LA1208449	1	25	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D035, U159)	N	HP TAG	C
LA1208449	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D008, D011, D001, D007, D005, D006, D009)	N	HP TAG	C
LA1208449	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D002)	N	HP TAG	C
LA1208449	1	22	LAB PACK (LABORATORY CHEMICALS AND WASTE D008, D011)	N	HP TAG	C
LA1208450	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE U201, P048)	N	HP TAG	C
LA1208450	4	40	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, D003)	N	HP TAG	C
LA1208450	1	30	LAB PACK (LABORATORY CHEMICALS AND WASTE D001, U154, U215, D035)	N	HP TAG	C
LA1208450	1	10	LAB PACK (LABORATORY CHEMICALS AND WASTE D001)	N	HP TAG	C
M001	1	456	- 55 GAL DRUM (SPENT PAINT RELATED MATERIAL D001)	Y	LOST DOCUMENTATION/POTENTIAL U-235	LR
M001	1	457	- 55 GAL DRUM (CHLORINATED SOLVENT F001)	Y	LOST DOCUMENTATION/POTENTIAL U-235	LR
M001	54	23,157	- 55 GAL DRUM (CHLORINATED SOLVENT F001)	Y	LOST DOCUMENTATION/POTENTIAL U-235	LR
NJA0307192	3	1,350	- 55 GAL. DRUM (SAMPLES NOT RCRA REGULATED)	Y	No Documentation Approval By DPSOL 709G-13	C
NJA0307192	10	4,500	- 55 GAL. DRUM (TRASH NOT RCRA REGULATED)	Y	No Documentation Approval By DPSOL 709G-13	C
NJA0603811	6	3,105	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	Y	C-34/NO DATA FOUND	C
NJA0603811	8	4,141	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	Y	C-35/NO DATA FOUND	LC
NJA0603811	16	8,275	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	Y	C-36/NO DATA FOUND	LC
NJA0603811	15	7,764	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, F003, F005)	Y	C-37/NO DATA FOUND	LC
NJA0667270	8	3,656	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-28/NO DATA FOUND	C
NJA0667270	8	3,656	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	N	C-31/NO DATA FOUND	C
NJA0667270	2	914	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	C-34/NO DATA FOUND	LC
NJA0667270	1	457	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	C-37/NO DATA FOUND	LC
NJA0667270	6	2,703	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	HP TAG	LC
NJA0667270	5	2,285	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	NO DATA	LC
NJA0667270	1	418	- 55 GAL. DRUM (SPENT PAINT SOLVENT D001, D008, F003, F005)	Y	NO DATA	LC
NJA0667277	3	1,494	- 55 GAL. DRUM (CHLORINATED SOLVENT F001, D006, D008)	Y	NO RECORD	LC

Table C-6. (continued).

Manifest	Number of drums	Weight (lb)	Description	RCA	Release procedure/other information	Category
NJA1025740	NA	38,890	SRTC TANKER TRAILER AQUEOUS WASTE D008	N	ADS 2-64633/NO POS. RESULTS, RADIOACTIVE BY PROCESS KNOWLEDGE	R
NJA1025742	NA	5,300	SRTC TANKER TRAILER AQUEOUS WASTE D008	N	ADS 2-64634/NO POS. RESULTS	C

Appendix D

1992–1993 Hazardous Waste Shipments

Table D-1 Shipments made from SRS to commercial TSDFs in 1992-1993.

Manifest	Drums	Weight (lb)	Description	RCA	Composite	Category
IL4587398	8	450	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	103-TBT-3/LSC	C
IL4587398	4	450	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	105-TBT-7/LSC	LR
IL4587398	12	450	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	106-TBT-5/LSC	LR
IL4587398	12	1,350	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	107-TBT-6/Tritium 6.9E-5 μ Ci/ml; Gamma ^{235}U 7.2E-3 nCi, ^{137}Cs 3.5E-3 nCi	R
IL4587398	11	1,350	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	108-TBT-4/Tritium 4.8E-4 μ Ci/ml; Gamma ^{235}U 6.0E-3 nCi, ^{137}Cs 3.8E-2 nCi	R
IL4587398	4	450	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	108-TBT-6/Tritium 5.6E-5 μ Ci/ml; Gamma ^{60}Co 1.1E-1 nCi, ^{137}Cs 1.8 nCi	R
IL4587398	12	450	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	109-TBT-1/LSC	C
IL4587398	12	1,350	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	110-TBT-8/Tritium 5.8E-5 μ Ci/ml; Gamma ^{60}Co 1.1E-1 nCi, ^{137}Cs 1.8 nCi	R
IL4587398	1	450	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	110-TBT-8(6)/	C
IL4587398	8	450	55 GAL. DRUMS TETRABUTYL TITANATE, D001	N	99-TBT-2/LSC	C
LAA3122774	6		55 GAL. DRUM LIQUID ORGANIC WASTE	N	NONE; RADIOACTIVE BY PROCESS KNOWLEDGE	R
LAA3122767	2		LABPACK XYLENE AND TOLUENE WASTE, 5 GALLONS TOTAL	N	NONE; RADIOACTIVE BY PROCESS KNOWLEDGE	R
NJA0667288	2	540	55 GAL DRUMS WASTE MOTOR OIL/GASOLINE, D001, D008	N	440 1-363-1 MS309/BOTH, SEVERAL γ EMITTERS	C
NJA0667288	2	540	55 GAL DRUMS WASTE MOTOR OIL/GASOLINE, D001, D008	N	441 1365-2 MS309/BOTH, SEVERAL γ EMITTERS	C
NJA0667288	1	475	55 GAL. DRUMS WASTE MARKING INK SOLUTION F003	N	BSR-237/LSC	C
NJA0667288	1	95	55 GAL. DRUM INK SOLVENT D001	N	BSR-265/BOTH, NO POS. γ	C
NJA0667288	16	2,428	55 GAL. DRUM SOLVENT RAGS, F001, F005, D008, D035, F003	N	HP BLUE TAG	C
NJA0667288	11	550	20 GAL. DRUMS RUST REMOVER SOLUTION, LABPACKED, D002, D006, D007	N	HP BLUE TAG	C
NJA0667288	11	3,300	55 GAL. DRUMS ACIDIC WASTE D002	N	MS-299/BOTH ^{203}Hg 1.4 nCi/g, RADIOACTIVE BY PROCESS KNOWLEDGE	R
NJA0667288	1	300	55 GAL. DRUMS OIL W/ 1,1,1 TRICHLOROETHANE, 6666, F002	N	MS-306/LSC	C
NJA0667288	1	350	55 GAL. DRUM FREON II W/ OIL, D019, D022	N	MS-306/LSC	C
NJA0667288	1	170	55 GAL. DRUMS ISOPARRAFINNIC PETROLEUM SOLVENT D001	N	MS-310/BOTH, NO POS. RESULTS	C
NJA0667288	4	1,600	55 GAL. DRUM MIRROR FLEX POLYURETHANE D001	N	MS-311/LSC	C
NJA0667288	15	5,895	55 GAL. DRUM ISOPROPYL ALCOHOL W/WATER, D001	N	MS-312/LSC, GPC. ALL LLD OR BELOW BKG.	C
NJA0667288	2	800	55 GAL. DRUM PROCESS SAMPLES W/Hg AND BENZENE, D009, D018	N	MS-313/LSC	C
NJA0667288	1	400	55 GAL. DRUM ACID WASTE W/Hg AND BENZENE, D009, D018	N	MS-315/LSC	C
NJA0667288	15	6,000	55 GAL DRUM IDMS SUMP CONTENTS, D009, D018	N	MS-317/LSC	C
NJA0667288	2	800	55 GAL. DRUM ACID WASTE W/ Hg AND BENZENE, D009, D018	N	MS-318/LSC	C
NJA0667288	2	800	55 GAL DRUM ACID WASTE W/ Hg D009	N	MS-319/LSC	C
NJA0667288	2	800	55 GAL. DRUM ACID WASTE W/ Hg D009	N	MS-320/BOTH, ^{144}Ce 1.1E-9 nCi/g	C
NJA0667288	5	2,000	55 GAL DRUM SILVER CATALYZED DISSOLVER WASTE D011	N	MS-321/BOTH, ^{144}Ce 1.4E-2 nCi/g	C
NJA1388171	1	400	55 GAL. DRUM MISC. ORGANIC WASTE WITH Hg, D001, D009	N	358-D1068/LSC	C
NJA1388171	1	495	55 GAL. DRUM WASTE PAINT D001	N	411-BSR-268-1/BOTH ^{139}Ce 1.7E-2 nCi/g	C
NJA1388171	1	495	55 GAL. DRUM WASTE PAINT D001	N	412-BSR-268-2/LSC	C
NJA1388171	1	200	55 GAL. DRUM PHEF SLUDGE W/BENZENE D018	N	447-D1278/LSC	C
NJA1388171	12	4,800	55 GAL. DRUM PHEF PRECIPITATE SLURRY W/SLUDGE D018	N	449-H1281/LSC	C

Table D-1. (continued).

Manifest	Drums	Weight (lb)	Description	RCA	Composite	Category
NJA1388171	8	3,200	55 GAL. DRUM PHEF PRECIPITATE SLURRY D018	N	451-TNX/LSC	C
NJA1388171	8	1,665	55 GAL. DRUM SOLVENT RAGS/WIPES, F001, F005	N	HP BLUE TAG	C
NJA1388171	1	300	55 GAL. DRUM WASTE ACTIVATOR D001	N	MS-100/LSC	C
NJA1388171	1	320	55 GAL. DRUM WASTE RESIN D001	N	MS-121/LSC	C
NJA1388171	12	5,760	55 GAL. DRUM WASTE FLAMMABLE LIQUID, D001, F003, D018	N	MS-304/LSC	C
NJA1388171	5	1,750	55 GAL. DRUM WASTE GROUT LIQUID D001	N	MS-84/LSC	C
NJA1388171	4	1,440	55 GAL. DRUM WASTE FLAKELINE 222, 252, D001	N	MS-86/LSC	C
NJA1388172	1	400	55 GAL. DRUM ORGANIC WASTE WITH Hg, D001, D009	N	393-D442/LSC	C
NJA1388172	1	400	55 GAL. DRUM MISC. ORGANICS W/Hg, D001, D009	N	446-D442/LSC	C
NJA1388172	1	400	55 GAL. DRUM SIMULATED SLUDGE, D009	N	92-0012/BOTH/ ¹⁴⁴ Ce 2.2E-01 nCi/g	C
NJA1388172	2	800	55 GAL. DRUM ORGANIC EVAP WASTE W/BENZENE, D018	N	92-0013/LSC	C
NJA1388172	1	400	55 GAL. DRUM ACID WASTE W/Hg, D009, D018	N	92-0014/LSC	C
NJA1388172	4	1,920	55 GAL. DRUM GAS/WATER D018	N	ADS-200069276/LSC, GPC/<LLD	C
NJA1388172	6	2,880	55 GAL. DRUM MACHINE COOLANT D008	N	ADS-200069332/LSC, GPC/GROSS α 2 D/M/ML	C
NJA1388172	2	400	55 GAL. DRUM ACID WASTE W/Hg, D009, D018	N	ADS-200070583/LSC, GPC/<LLD	C
NJA1388172	2	400	55 GAL. DRUM ACID WASTE W/BENZENE AND Hg, D018, D009	N	ADS-200072234/LSC, GPC/<LLD	C
NJA1388172	2	800	55 GAL. DRUM ACID WASTE W/Hg AND BENZENE, D009, D018	N	ADS-200076521, ADS-200074477/LSC, GPC/<LLD	C
NJA1388172	4	1,600	55 GAL. DRUM PHEF PRECIPITATE, D018	N	ADS-200076525/LSC, GPC/<LLD	C
NJA1388172	2	800	55 GAL. DRUM ACID WASTE W/Hg, D009, D018	N	D1286/LSC	C
NJA1388172	9	1,510	55 GAL. DRUM SOLVENT RAGS/WIPES, F001, F005	N	HP TAG	C
NJA1388172	4	800	55 GAL. DRUM SOLVENT RAGS/WIPES, F001	N	HP BLUE TAG	C
NJA1388172	18	8,100	55 GAL. DRUM DWPF SIMULATED SLUDGE D009	N	MS-14/LSC	C
NJA1388172	1	400	55 GAL. DRUM STYRENE, D001	N	MS-291/LSC	C
NJA1388172	3	1,254	55 GAL. DRUM WASTE PAINT SOLVENT F003, F005	N	MS-305/LSC	C
NJA1388172	3	1,200	55 GAL. DRUM MIRROR FLEX POLYURETHANE, D001	N	MS-311/LSC	C
NJA1388172	1	350	55 GAL. DRUM WASTE PRIMER, D001	N	MS-83/LSC	C
NJA1388172	1	50	55 GAL. DRUM GAS/OIL/WATER, D001, D008	N	NO POSITIVE RESULTS	C
NJA1388172	3	1,200	55 GAL. DRUM MISC. ORGANICS W/BENZENE & Hg, D001, D009, D018	N	NO POSITIVE RESULTS	C
NJA1388175	3	1,200	55 GAL. DRUM ORGANIC EVAORATOR WATER, D018	N	452-D1279, 92-0013/LSC	C
NJA1388175	5	2,000	55 GAL. DRUM STPB SUPERNATE/PRECIPITATE W/NITROBENZENE, D036	N	92-0007/LSC	C
NJA1388175	17	6,800	55 GAL. DRUM PRECIPITATE WASH WATER, D018, D036	N	92-0008/LSC	C
NJA1388175	15	6,000	55 GAL. DRUM PRECIPITATE WASH WATER, D018, D036	N	92-0011/LSC	C
NJA1388175	2	800	55 GAL. DRUM AQUEOUS WASTE, D018, D036	N	92-0025/LSC	C
NJA1388175	6	2,400	55 GAL. DRUM PRECIPITATE W/ANITFOAM W/BENZENE, D018, D036	N	92-0026/LSC	C
NJA1388175	8	2,400	55 GAL. DRUM PRECIPITATE WASH WATER, D018, D036	N	92-0027/LSC	C
NJA1388175	6	2,400	55 GAL. DRUM PRECIPITATE W/ANITFOAM W/BENZENE, D018, D036	N	92-0028/LSC	C
NJA1388175	4	1,600	55 GAL. DRUM KTPB SLURRY W/BENZENE, NITROBENZENE, D018, D036	N	92-0029/LSC	C
NJA1388175	1	480	55 GAL. DRUM WASTE PAINT, D001, D035	N	ADS-200066527/LSC, GPC/<LLD	C
NJA1388175	1	350	55 GAL. DRUM FREON II IN OIL, D019	N	ADS-200074311/LSC, GPC/<LLD	C

Table D-1. (continued).

Manifest	Drums	Weight (lb)	Description	RCA	Composite	Category
NJA1388175	1	400	55 GAL. DRUM TPB SLURRY W/BENZENE, D018	N	ADS-200074478/LSC, GPC/<LLD	C
NJA1388175	2	878	55 GAL. DRUM UNUSABLE PAINT, D001, D035	N	ADS-200075209/LSC, GPC/2 D/M/ML α	C
NJA1388175	2	800	55 GAL. DRUM ACID WASTE W/Hg AND BENZENE, D009, D018	N	ADS-200076523, ADS-200078469/LSC, GPC /<LLD	C
NJA1388175	1	400	55 GAL. DRUM PHEF PRECIPITATE SLURRY, D018	N	ADS-200076525/LSC, GPC/<LLD	C
NJA1388175	8	1,454	55 GAL. DRUM SOLVENT RAGS/WIPES F001, F005	N	HP TAG	C
NJA1388176	1	30,440	TANKER TRAILER AQUEOUS WASTE W/Hg, NON RCRA REGULATED	N	ADS-200083577/LSC, GPC /<LLD	C
NJA1388177	1	44,880	TANKER TRAILER AQUEOUS WASTE W/Hg, NON RCRA REGULATED	N	ADS-200087705/LSC, GPC /<LLD	C
NJA1388178	1	12,450	TANKER TRAILER AQUEOUS WASTE W/Hg, NON RCRA REGULATED	N	ADS-200087705/LSC, GPC /<LLD	C
NJA1388179	1	35,140	TANKER TRAILER AQUEOUS WASTE W/Hg, NON RCRA REGULATED	N	ADS-300003395/LSC, GPC /<LLD	C
NJA1388180	1	42,380	TANKER TRAILER AQUEOUS WASTE W/Hg, NON RCRA REGULATED	N	ADS-300003396/LSC, GPC /<LLD	C
NJA1388181	1	44,100	TANKER TRAILER AQUEOUS WASTE W/Hg, NON RCRA REGULATED	N	ADS-300004320, 4321, 4322/LSC, GPC/LLD	C
NJA1388182	1	42,120	TANKER TRAILER AQUEOUS WASTE W/Hg, NON RCRA REGULATED	N	ADS-300004317, 4318, 4319, 4323/LSC, GPC /<LLD	C

Appendix E

Hazardous Waste Shipment Manifests

Appendix E

Hazardous Waste Shipment Manifests

Table E-1. Information about SRS hazardous waste shipment manifests, 1984-1993.

Manifest	Ship date	TSDF	Radioactive drum?	State	Total drums
00275215	10/30/90	RES/DEER PARK	N	TX	1
00275216	10/30/90	RES/DEER PARK	N	TX	9
00285327	5/30/91	RES/DEER PARK	N	TX	1
00285328	12/20/90	RES/DEER PARK	N	TX	2
00285329	12/20/90	RES/DEER PARK	N	TX	1
00285331	12/20/90	RES/DEER PARK	N	TX	9
30002	2/4/88	Ross Incineration Services/Grafton		OH	5
60001	12/28/89	Capital Silver Service/Gallatin	N	TN	42
AER00959	7/4/90	Capital Silver Service/Gallatin	N	TN	1 TANKER
AER01009	7/4/90	Capital Silver Service/Gallatin	N	TN	1 LAB PACK
AER01030	7/4/90	Capital Silver Service/Gallatin	N	TN	1 TANKER
AER10482	3/15/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10483	3/16/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10483	3/16/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10484	3/16/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10485	3/16/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10486	3/16/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10511	3/18/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10512	3/18/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10513	3/18/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10514	3/18/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10522	3/18/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
AER10523	3/19/91	Alternate Energy Resources/Augusta	N	GA	1 TANKER
CWMA487415	6/9/89	CWM/CHICAGO	N	IL	157
IL2039154	3/21/89	CWM/CHICAGO	4	IL	60
IL2039155	3/28/89	CWM/CHICAGO	2	IL	59
IL2093344	9/27/88	CWM/CHICAGO	N	IL	56
IL2093345	9/28/88	CWM/CHICAGO	N	IL	63
IL2093346	9/28/88	CWM/CHICAGO	3	IL	56
IL2093348	9/29/88	CWM/CHICAGO	64	IL	64
IL3133781	6/5/89	CWM/CHICAGO	25	IL	257 LAB PACKS
IL3133799	9/1/89	CWM/CHICAGO	N	IL	206 LAB PACKS
IL4003242	6/12/89	CWM/CHICAGO	21	IL	214 LAB PACKS
IL4587398	10/15/92	CWM/SAUGET	63	IL	84
LA1035009	11/23/87	RES/BATON ROUGE	N	LA	59
LA1035010	11/24/87	RES/BATON ROUGE	1	LA	61
LA1035013	11/19/87	RES/BATON ROUGE	N	LA	65
LA1035014	11/18/87	RES/BATON ROUGE	N	LA	60
LA1035015	11/18/87	RES/BATON ROUGE	N	LA	60
LA1046919	9/27/88	RES/BATON ROUGE	N	LA	74
LA1046920	9/27/88	RES/BATON ROUGE	N	LA	23
LA1093838	1/16/89	RES/BATON ROUGE	N	LA	52

Table E-1. (continued).

Manifest	Ship date	TSDF	Radioactive drum?	State	Total drums
LA1163777	2/14/90	RES/BATON ROUGE	N	LA	20
LA1163880	2/14/90	RES/BATON ROUGE	N	LA	32
LA1163882	7/2/90	RES/BATON ROUGE	N	LA	11 LAB PACKS
LA1163883	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1163884	4/4/91	RES/BATON ROUGE	N	LA	20 LAB PACKS
LA1163885	4/29/91	RES/BATON ROUGE	N	LA	85
LA1163910	4/4/91	RES/BATON ROUGE	N	LA	7 LAB PACKS
LA1163912	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1163913	4/4/91	RES/BATON ROUGE	N	LA	5 LAB PACKS
LA1163914	4/4/91	RES/BATON ROUGE	N	LA	7 LAB PACKS
LA1163915	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1163916	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1163917	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1163918	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1163919	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1163920	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1163921	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1163976	1/11/90	RES/BATON ROUGE	N	LA	52, 7 LAB PACKS
LA1163977	1/11/90	RES/BATON ROUGE	N	LA	9 LAB PACKS
LA1163978	1/11/90	RES/BATON ROUGE	N	LA	1, 2 LAB PACKS
LA1163979	1/11/90	RES/BATON ROUGE	N	LA	30 LAB PACKS
LA1163980	1/11/90	RES/BATON ROUGE	N	LA	42 LAB PACKS
LA1163981	1/11/90	RES/BATON ROUGE	N	LA	48 LAB PACKS
LA1163982	1/11/90	RES/BATON ROUGE	N	LA	15, 7 LAB PACKS
LA1163983	1/11/90	RES/BATON ROUGE	N	LA	2, 28 LAB PACKS
LA1163984	1/11/90	RES/BATON ROUGE	N	LA	59 LAB PACKS
LA1163985	1/11/90	RES/BATON ROUGE	N	LA	65 LAB PACKS
LA1164160	8/16/90	RES/BATON ROUGE	N	LA	22 LAB PACKS
LA1164161	8/16/90	RES/BATON ROUGE	N	LA	11 LAB PACKS
LA1164162	8/16/90	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1164163	8/16/90	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1164164	8/16/90	RES/BATON ROUGE	N	LA	16 LAB PACKS
LA1164165	8/16/90	RES/BATON ROUGE	N	LA	6 LAB PACKS
LA1164166	8/16/90	RES/BATON ROUGE	N	LA	7 LAB PACKS
LA1164167	8/16/90	RES/BATON ROUGE	N	LA	1, 5 LAB PACKS
LA1164168	8/16/90	RES/BATON ROUGE	N	LA	18, 2 LAB PACKS
LA1164169	8/16/90	RES/BATON ROUGE	N	LA	7 LAB PACKS
LA1164170	8/16/90	RES/BATON ROUGE	N	LA	31 LAB PACKS
LA1208376	6/6/91	RES/BATON ROUGE	N	LA	18
LA1208377	6/6/91	RES/BATON ROUGE	N	LA	5
LA1208378	6/6/91	RES/BATON ROUGE	N	LA	22
LA1208379	6/6/91	RES/BATON ROUGE	N	LA	22
LA1208380	6/6/91	RES/BATON ROUGE	N	LA	180
LA1208381	7/26/91	RES/BATON ROUGE	N	LA	18 LAB PACKS
LA1208382	7/26/91	RES/BATON ROUGE	N	LA	80 LAB PACKS
LA1208383	7/26/91	RES/BATON ROUGE	N	LA	5 LAB PACKS
LA1208384	7/26/91	RES/BATON ROUGE	N	LA	21 LAB PACKS

Table E-1. (continued).

Manifest	Ship date	TSDF	Radioactive drum?	State	Total drums
LA1208385	7/26/91	RES/BATON ROUGE	N	LA	13 LAB PACKS
LA1208386	7/26/91	RES/BATON ROUGE	N	LA	5 LAB PACKS
LA1208387	7/26/91	RES/BATON ROUGE	N	LA	37, 7 LAB PACKS
LA1208388	7/26/91	RES/BATON ROUGE	N	LA	75 LAB PACKS
LA1208389	7/26/91	RES/BATON ROUGE	N	LA	36 LAB PACKS
LA1208390	7/26/91	RES/BATON ROUGE	N	LA	63 LAB PACKS
LA1208391	7/26/91	RES/BATON ROUGE	N	LA	1, 3 LAB PACKS
LA1208392	7/26/91	RES/BATON ROUGE	N	LA	2, 2 LAB PACKS
LA1208393	7/26/91	RES/BATON ROUGE	N	LA	3 LAB PACKS
LA1208394	7/26/91	RES/BATON ROUGE	N	LA	5 LAB PACKS
LA1208395	7/26/91	RES/BATON ROUGE	N	LA	28 LAB PACKS
LA1208396	7/26/91	RES/BATON ROUGE	N	LA	63, 28 LAB PACKS
LA1208397	7/26/91	RES/BATON ROUGE	N	LA	8 LAB PACKS
LA1208426	10/20/90	RES/BATON ROUGE	N	LA	10
LA1208427	10/20/90	RES/BATON ROUGE	N	LA	28
LA1208428	10/30/90	RES/BATON ROUGE	B	KA	4
LA1208429	12/20/90	RES/BATON ROUGE	N	LA	17
LA1208430	12/20/90	RES/BATON ROUGE	N	LA	6
LA1208431	12/20/90	RES/BATON ROUGE	N	LA	14
LA1208432	12/20/90	RES/BATON ROUGE	N	LA	15
LA1208433	12/20/90	RES/BATON ROUGE	N	LA	6
LA1208435	2/28/91	RES/BATON ROUGE	1	LA	5
LA1208436	2/28/91	RES/BATON ROUGE	N	LA	50
LA1208437	2/28/91	RES/BATON ROUGE	N	LA	9 LAB PACKS
LA1208438	2/29/91	RES/BATON ROUGE	N	LA	14 LAB PACKS
LA1208439	2/28/91	RES/BATON ROUGE	N	LA	4, 67 LAB PACKS
LA1208440	2/28/91	RES/BATON ROUGE	N	LA	2 LAB PACKS
LA1208441	4/4/91	RES/BATON ROUGE	N	LA	12, 69 LAB PACKS
LA1208442	4/4/91	RES/BATON ROUGE	N	LA	49
LA1208443	4/4/91	RES/BATON ROUGE	N	LA	126, 118 LAB PACKS
LA1208444	4/4/91	RES/BATON ROUGE	N	LA	7, 3 LAB PACKS
LA1208445	4/4/91	RES/BATON ROUGE	N	LA	7, 42 LAB PACKS
LA1208446	4/4/91	RES/BATON ROUGE	N	LA	32, 46 LAB PACKS
LA1208447	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1208448	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1208449	4/4/91	RES/BATON ROUGE	N	LA	4 LAB PACKS
LA1208450	4/4/91	RES/BATON ROUGE	N	LA	7 LAB PACKS
LA1209379	6/6/91	RES/BATON ROUGE	N	LA	1
LAA3122767	9/9/92	RES/BATON ROUGE	2	LA	2
LAA3122774	9/23/92	RES/BATON ROUGE	6	LA	6
MOO1	2/28/87	Safety Kleen/New Castle		KY	56
NJA0307048	11/16/87	RES/BRIDGEPORT	N	NJ	60
NJA0307185	11/12/87	RES/BRIDGEPORT	N	NJ	61
NJA0307186	11/16/87	RES/BRIDGEPORT	N	NJ	60
NJA0307187	11/10/87	RES/BRIDGEPORT	N	NJ	60
NJA0307189	10/26/87	RES/BRIDGEPORT	N	NJ	60
NJA0307190	10/26/87	RES/BRIDGEPORT	N	NJ	60

Table E-1. (continued).

Manifest	Ship date	TSDF	Radioactive drum?	State	Total drums
NJA0307191	11/10/87	RES/BRIDGEPORT	N	NJ	60
NJA0307192	11/24/87	RES/BRIDGEPORT	N	NJ	51
NJA0307197	10/20/87	RES/BRIDGEPORT	N	NJ	60
NJA0307198	10/20/87	RES/BRIDGEPORT	N	NJ	60
NJA0546927	10/25/88	RES/BRIDGEPORT	1	NJ	1
NJA0603811	2/28/89	RES/BRIDGEPORT	N	NJ	60
NJA0667270	7/7/89	RES/BRIDGEPORT	N	NJ	83
NJA0667272	8/17/89	RES/BRIDGEPORT	N	NJ	71
NJA0667273	1/18/90	RES/BRIDGEPORT	22	NJ	74
NJA0667274	2/13/90	RES/BRIDGEPORT	2	NJ	75
NJA0667275	3/27/90	RES/BRIDGEPORT	N	NJ	80
NJA0667276	3/28/90	RES/BRIDGEPORT	N	NJ	77
NJA0667277	3/29/90	RES/BRIDGEPORT	N	NJ	83
NJA0667278	7/11/91	RES/BRIDGEPORT	N	NJ	69
NJA0667288	12/5/91	RES/BRIDGEPORT	11	NJ	98
NJA1025740	12/17/91	RES/BRIDGEPORT	1	NJ	1 TANKER
NJA1025742	12/20/91	RES/BRIDGEPORT	N	NJ	1 TANKER
NJA1388171	3/2/92	RES/BRIDGEPORT	N	NJ	55
NJA1388172	6/2/92	RES/BRIDGEPORT	N	NJ	71
NJA1388175	8/13/92	RES/BRIDGEPORT	N	NJ	82
NJA1388176	9/1/92	RES/BRIDGEPORT	N	NJ	1 TANKER
NJA1388177	11/12/92	RES/BRIDGEPORT	N	NJ	1 TANKER
NJA1388178	11/18/92	RES/BRIDGEPORT	N	NJ	1 TANKER
NJA1388179	2/13/93	RES/BRIDGEPORT	N	NJ	1 TANKER
NJA1388180	2/13/93	RES/BRIDGEPORT	N	NJ	1 TANKER
NJA1388181	3/18/93	RES/BRIDGEPORT	N	NJ	1 TANKER
NJA1388182	3/17/93	RES/BRIDGEPORT	N	NJ	1 TANKER
Total drums			229		144,674

Table E-2. All radioactive shipments from SRS to commercial TSDFs.

Manifest	Total weight (lb)	Weight of rad drums (lbs)	Description	Isotopes	Date shipped
IL2039154	33,000	2,200	- 55 GAL. DRUM (LEAD OIL D008)	^{235}U , ^{137}Cs	3/21/89
IL2039155	34,720	1,008	- 55 GAL. DRUM (LEAD OIL D008)	^{235}U	3/28/89
IL2093346	27,030	978	- 55 GAL. DRUM (LEAD OIL D008)	^{235}U , ^{137}Cs	9/28/88
NJA0667273	34,650	9,900	- 55 GAL. DRUM (ORGANIC SOLVENT F001)	—	1/18/90
LA1035010	31,010	510	- 55 GAL. DRUM (ORGANIC SOLVENTS F003, F005, D008, D001)	^{238}Pu , ^{90}Sr , ^{235}U , ^{241}Am , ^{35}S , ^{90}Y	11/24/87
LA1208435	2,000	500	- 55 GAL. DRUM (ORGANIC SOLVENTS F005, D001)	^{238}Pu , ^{90}Sr , ^{235}U , ^{241}Am , ^{35}S , ^{90}Y	2/28/91
NJA0546927	400	400	- 55 GAL. DRUM (ORGANIC SOLVENT D001)	^{235}U	10/25/88
NJA0667274	41,250	910	- 55 GAL. DRUM (SPENT PAINT SOLVENT F003, F005, D008)	Tritium	2/13/90
IL3133781	15,844	680	LAB PACKS (LEAD OIL D008)	^{235}U	6/5/89
IL3133781		136	LAB PACKS (1,1,1 TRICHLOROETHANE SLUDGE D008)	^{235}U	6/5/89
IL4003242	17,253	1,620	LAB PACKS (LEAD OIL D008)	^{235}U	6/12/89
IL2093348	11,194	7,978	- 55 GAL. DRUM (LEAD OIL SOLID D008)	Potential ^{235}U	9/28/88
IL2093348	11,194	4,462	- 55 GAL. DRUM (LEAD OIL SOLID D008)	Potential ^{235}U	9/28/88
IL3133781	17,000	Unknown	- LAB PACKS (CLEAN UP DEBRIS NOT RCRA REGULATED)	Potential ^{235}U	6/5/89
IL4587398	7,200	5,400	55 GAL. DRUMS TETRABUTYL TITANATE, D001	Tritium	10/15/92
LAA3122774	Unknown	Unknown	55 GAL. DRUM LIQUID ORGANIC WASTE	^{242}Pu , ^{90}Sr , ^{238}Pu , ^{90}Sr , ^{235}U , ^{241}Am , ^{35}S , ^{90}Y	9/23/92
LAA3122767	Unknown	Unknown	LABPACK XYLENE AND TOLUENE WASTE, 5 GALLONS TOTAL	^{90}Sr , ^{238}Pu , ^{90}Y	9/9/92
NJA0667288	11	3,300	55 GAL. DRUMS ACIDIC WASTE D002	^{242}Pu , ^{232}U , ^{90}Sr , ^{90}Y	12/5/91
NJA1025740	38,890	38,890	SRTC TANKER TRAILER AQUEOUS WASTE D008	^{242}Pu , ^{232}U , ^{90}Sr , ^{90}Y	12/17/91

Appendix F

Evaluation of Passive Active Neutron Analytical Results

INTEROFFICE CORRESPONDENCE

Date: January 6, 1993
To: C. E. Casey, MS 3960
From: E. B. Nieschmidt, MS 7113 *Juni Hoste for*
Subject: ANALYSIS OF SR DRUMS - EBN-01-93
Reference: Letter D. J. Zecha to J. D. Kuhns, dated November 6, 1992,
Westinghouse Savannah River Company

The above letter contains a description of the measurements of uranium content of a number of 30 gallon and 55 gallon drums of waste. The measurement was accomplished with thermal neutron interrogation using a Passive/Active Neutron assay device (PAN). Also included in this letter is certain counting information acquired during the measurements. This note is an evaluation and critique of the Savannah River results as well as a recommendation. The results as stated in the reference are probably good to 100-200%, no better.

The PAN system uses neutrons produced by a 14 MeV neutron generator, moderating material and neutron detectors to assay drums (or boxes) for fissionable material. The device also uses a passive mode to evaluate the containers content of spontaneous fissioning species and neutrons produced by (α ,n) reactions.

The neutron spectrum within a PAN device is strongly influenced by the material in the container, e.g. moderators and absorbers. These affect both the magnitude of the interrogating flux and its' temporal behavior. These effects are accommodated for by a Matrix Correction Factor-Active (MCFA) used as a multiplicative constant. The MCFA is derived from the counts from various Cd shielded detectors and unshielded detectors. The constants used in arriving at the MCFA depend upon the individual PAN unit being used. No estimate of the veracity of the stated MCFAs can be given. However, the MCFA values given will be used in the analysis. All of the acronyms used in this analysis are defined in the referenced letter.

The analysis of the SR data has been performed in the following manner, variable with a bar above them are average values, i.e. MCFA = average value of MCFA.

1. Test consistency of counting rates,
 - a) of loaded drums with no U,
 - b) of loaded drums with U standard,
 - c) of the values of MCFA.

2. Calculation of means and standard deviations of the various parameters
 - a) Shielded Active Signal (SHASIG) Equation of standard drums with and without U.
 - b) Shielded Active Background (SHABK) as above.
3. Test (Z test) MCFA with and without U, result MCFA (no U) = MCFA (with U), so, pool data.
4. Using SHASIG and MCFA with and without U calculated

$$\epsilon = \frac{\overline{SHASIG} - \overline{SHABK}}{g^{235} \cdot 200\mu s \cdot 2000 \text{ pulses}}$$

5. Using the value of ϵ calculate gram $M^{235}U$ (y) = $\frac{\text{net counts}}{\epsilon}$ for the unknown drums.
6. The sequence was performed for both 55 gallon drums and 30 gallon drums.

The results of this analysis are displayed in table 1 and table 2 below.

Table 1. Results of Analysis of 55 Gallon Drum Counting Data

From the mock up drum data:

$$\overline{MCFA} = 1.4935 \pm 0.0417 \quad \overline{SHASIG}(noU) = 71.8 \pm 7.9$$

, and

$$\epsilon = 2749 \pm 380 \frac{\text{counts}}{200\mu s \cdot \text{gram}^{235}U \cdot 2000 \text{ pulses}}$$

Drum #	Date	SHASIG	MCFA	$M^{235}U(g)(\text{error})$	SR Value
55 gal	3/16/89	84	1.4305	0.006(0.001)	0.01
55 gal	3/16/89	64	1.4373	-----	----
55 gal	3/16/89	77	1.5462	0.003(0.001)	0.01
55 gal	3/16/89	63	1.4432	-----	----
0.29 Std.	3/16/89	637	1.5373	0.312(0.046)	0.30
0.29 Std.	3/16/89	661	1.4844	0.318(0.046)	0.31
0.29 Std.	3/16/89	641	1.5412	0.319(0.046)	0.31
303	3/16/89	310	1.0000	0.087(0.013)	0.08
299	3/16/89	1694	1.0000	0.590(0.084)	0.51
55 gal	3/17/89	72	1.5029	-----	0.01

Table 1. Results of Analysis of 55 Gallon Drum Counting Data (cont)

Drum #	Date	SHASIG	MCFA	²³⁵ U(g)(error)	SR Value
0.29 Std.	3/17/89	559	1.5800	0.280(0.041)	0.27
440	3/17/89	312	1.3628	0.119(0.018)	0.10
422	3/17/89	355	1.0457	0.108(0.016)	0.08
428	3/17/89	500	1.0000	0.155(0.023)	0.12
319	3/17/89	1714	1.0000	0.590(0.085)	0.46
524	3/17/89	4110	1.0000	1.452(0.207)	1.30
431	3/17/89	385	1.0000	0.113(0.017)	0.10
149	3/17/89	345	1.0000	0.098(0.001)	0.08
298	3/17/89	672	1.0000	0.216(0.032)	0.20
357	3/17/89	9328	1.0000	3.328(0.472)	2.78
55 gal	3/20/89	71	1.5162	-----	0.01
0.29 Std.	3/20/89	490	1.4895	0.224(0.033)	0.22
250	3/20/89	457	1.0000	0.138(0.020)	0.12
58	3/20/89	648	1.0000	0.207(0.030)	0.20
3	3/20/89	625	1.0000	0.199(0.029)	0.18

Table 2. Results of Analysis of 30 Gallon Drum Counting Data
From the mock up drum data:

$$\overline{MCFA} = 1.000 \pm 0$$

$$\overline{SHASIG}(no\ U) = 66.0 \pm 8.2$$

, and

$$\epsilon = 2694.9 \pm 89.5 \frac{\text{counts}}{200\mu s \cdot g^{235}U \cdot 2000 \text{ pulses}}$$

Drum #	Date	SHASIG	MCFA	²³⁵ U(g)(error)	SR Value
30 gal	6/5/89	55	1.0000	-----	0.00
0.29 Std.	6/5/89	810	1.0000	0.276(0.041)	0.19
315	6/5/89	446	1.0000	0.141(0.023)	0.09
356	6/5/89	370	1.0000	0.113(0.018)	0.09
0.29 Std.	6/5/89	855	1.0000	0.293(0.041)	0.20
0.29 Std.	6/5/89	811	1.0000	0.276(0.041)	0.19
336	6/5/89	239	1.0000	0.064(0.001)	0.04
0.29 Std.	6/5/89	796	1.0000	0.271(0.046)	0.19
30 gal	6/6/89	64	1.0000	-----	0.00
0.29 Std.	6/6/89	851	1.0000	0.291(0.041)	0.21
302	6/6/89	288	1.0000	0.082(0.010)	0.06

Table 2. Results of Analysis of 30 Gallon Drum Counting Data (cont)

Drum #	Date	SHASIG	MCFA	²³⁵ U(g)(error)	SR Value
396	6/6/89	669	1.0000	0.224(0.033)	0.17
395	6/6/89	1174	1.0000	0.411(0.207)	0.29
0.29 Std.	6/6/89	842	1.0000	0.288(0.041)	0.20
383	6/6/89	394	1.0000	0.122(0.018)	0.09
30 gal	6/7/89	75	1.0000	0.003(0.001)	0.00
0.29 Std.	6/7/89	864	1.0000	0.296(0.041)	0.21
466	6/7/89	476	1.0000	0.152(0.019)	0.11
465	6/7/89	982	1.0000	0.340(0.045)	0.23
0.29 Std.	6/7/89	836	1.0000	0.286(0.041)	0.20
467	6/7/89	531	1.0000	0.172(0.020)	0.12
0.29 Std.	6/7/89	856	1.0000	0.243(0.040)	0.20

The minimum detectable quantity of ²³⁵U was calculated from

$$MIN = \frac{3\sigma (SHASIG(no U))}{\epsilon}$$

and is 0.078 g²³⁵U for the 55 gal drums, and 0.090 g²³⁵U for the 30 gal drums. The value of MIN computed from only three (no U) 30 gal. drums is fictitiously low. Therefore, this value 0.09 is estimated such that it is equal to or greater than that 55 gal drums. This is from the standard estimate of minimum detectable activity being 3σ of background above background.

There are certain inconsistencies in the data. The values of MCFA for the 55 gallon mock-up drums with and without U have values of ≈ 1.5, whereas, those for the unknown drums are ≈ 1.0. This indicates that the mock-up did not really represent the waste material in the drums. The 30 gallon drum mock-ups and waste drums all have MCFA = 1.0. One would expect the value to be approximately proportional to the matrix mass if the matrices are identical. So, the 30 gallon drums would be expected to have MCFA ≈ 1.25, not 1.0. This indicates that the collimated detector only sees a small fraction of the 30 gallon drum or some such problem.

All the drums, except 303, 336 and 382, have amounts of ²³⁵U above the minimum detectable mass. The masses determined are that of ²³⁵U not total U. If the isotopics of the standard and the waste drums is known these values can be converted to masses of U.

C. E. Casey
January 6, 1993
EBN-01-93
Page 5

In conclusion, the estimates of ^{235}U masses are probably good to within 100%-200%, no better. To verify the isotopics the drums should be analyzed at SWEPP where facilities for gamma-ray analysis are available.

Westinghouse
Savannah River Company

DRAFT

P.O. Box 616
Aiken, SC 29802

WER-SWD-92-0577

November 9, 1992

Mr. V. W. Sauls, Chief
Solid Waste Programs Branch
Solid Waste Division
U. S. Department of Energy
Aiken, SC 29802

Dear Mr. Sauls:

OFFSITE SHIPMENT OF HAZARDOUS WASTE (LETTER, O'REAR TO CIOFFI, 8/26/92)

Ref. V. W. Sauls to R. C. Shank, October 19, 1992

The referenced letter requested an evaluation of the analytical test results from passive active neutron analysis of 24 containers of lead oil cleanup debris. This evaluation has been completed and is provided as Attachment I.

Additionally, several difficulties were encountered during the review of the documentation corresponding to the passive active neutron analyses. These have previously been detailed by the Westinghouse Savannah River Company in the Froidl to Goforth "Don't Say It - Write It" dated September 11, 1992. As requested in the referenced letter, resolutions to these problems have been developed and are provided as Attachment II.

If you have any questions, please contact D. J. Zecha at extension 24759.

Sincerely,

BA. Daugherty for R.C. Shank

R. C. Shank, Manager
Solid Waste Management Engineering

/djz

Attachments

CC: J. G. Sonnenberg, 724-7E
L. T. Reid, 724-9E
WME File, 703-H
File Code: WM 186.10

DRAFT**ATTACHMENT I**

WESTINGHOUSE SAVANNAH RIVER COMPANY
ANALYTICAL LABORATORIES
SAMPLING AND SCREENING GROUP

ESH-ALW-92-0031

CC: WSRC

J.G. DONNAN, 772-3F
A. GIBBS, 707-C
W.R. JACOBSEN, 703-10C
J.G. SONNENBERG, 724-7E
G.P. FROIDL, 709-1G
L.T. REID, 724-9E
G.L. JACKSON, 709-G
D.G. POULOS, 730-M
M.B. HUGHES, 703-10C
F.R. WEITZ, 730-M
R.A. HANE, 724-E

DOE

S.R. ROSS, 703-A

TO: D.J. ZECHA, 724-7E

NOVEMBER 6, 1992

FROM: J.D. KUHS, 245-6F *JK*

AN EVALUATION OF EG&G IDENTIFIED PASSIVE ACTIVE NEUTRON (PAN)
ANALYTICAL RESULTS (U)

After evaluating the 24 235-U Passive Active Neutron (PAN) analytical results identified by EG&G, it was determined that three of the 55-gallon and one of the 30-gallon lead-oil solids drums screening results were below the minimum detectable mass (MDM) for the PAN. The remaining eleven 55-gallon and nine 30-gallon lead-oil solids drums (Table III) have a positive 235-U mass above the MDM for the PAN.

SCOPE

In 1988, at the request of the Raw Materials Engineering & Technology Department and Waste Management, the Laboratories Department - Special Laboratories Section evaluated the feasibility of using the PAN for screening M-Area drummed waste to insure that the waste could be shipped offsite in compliance with the Department of Transportation (DOT) 2 nCi/g limit^{1,5}. Evaluations of the PAN during August 1988 determined that the PAN could be used as a screening instrument to meet the 2 nCi/g DOT limit². There were four M-Area drummed waste PAN screening campaigns with the first one in August 1988 and the last one in October 1989. Due to a moratorium placed on all DOE sites concerning the shipment of hazardous wastes generated inside Radiologically Controlled Areas (RCAs) an audit team from EG&G Idaho is investigating SRS shipment records to assure only non-radioactive hazardous waste (NRHW) was shipped offsite for disposal. This memorandum evaluates the 24 PAN analytical results specifically identified by the audit team which were screened during the second and third screening campaigns⁹.

DRAFT**METHOD**

All PAN assay screens were performed to provide compliance with the 2 nCi/g limit set by DOT for non-radioactive shipment classification per 49 CFR 173.403². The PAN assay measurements were performed using a Los Alamos developed second-generation system for passive and active neutron assays of drum-size containers³. The combined nondestructive passive and active neutron counting technique is used to quantify total fissile and spontaneous fissioning radionuclides contained in waste. Neutron counting has been used to sort waste into transuranic and low-level waste categories.

The active mode uses differential die-away thermal neutron interrogation; prompt-fission totals neutron counting; and then corrects for neutron moderator and absorber behavior in the waste to determine the fissile mass. It provides rapid results and can be routinely applied to a variety of materials in containers as large as 55 gallon drums. Isotopes which have been analyzed using the active mode include 233-U, 235-U, and 239-Pu. The active mode has been used to analyze items whose 235-U and/or 239-Pu inventory ranges from 0.001g to over 10 g. To apply this method the relative isotopic abundances of the isotopes must be known.

To provide a complete active and passive certification measurement for the PAN, one that can be carried out daily, the vendor packaged a 235-U standard and a 252-Cf source that are traceable to National Institute of Standards and Technology (NIST) in a "Pink Drum"³. The "Pink Drum" was assayed each day as the first and last data acquisition. The calibration of the PAN was done using 93% 235-U foils and a test drum furnished by Raw Materials Engineering & Technology Department⁴. The test drum that was prepared had all new materials of KevlarTM gloves, mop heads and rags that were soaked in new 00999 THUBAN SAE 140 gear oil, manufactured by Texaco Inc. A new DOT specification 17C steel drum was also used. The packages of enriched uranium foils were weighed and labeled individually. The scales used to weigh the foils were calibrated with NIST traceable standards. The uranium foils' composition complies with Essential Materials Specification MS110 for high purity Oralloy.

The smallest of the foils (0.3071g U) was checked before the M-Area waste drums were assayed. The foil was placed in the test drum of clean synthetic waste for measurement. The test drum of synthetic waste was also measured by itself to determine the minimum detectable limits (MDL) of the PAN.

DRAFT

LIMITATIONS OF PAN ASSAYS

Since the calibration factor used in the calculation is isotopic specific, the resulting fissile mass estimate will be inaccurate if an unknown mixture of isotopes is present. The moderation and absorption of neutrons in the waste matrix can have a large effect on the active signal. Correction factors for these effects can be obtained from calibrations using mock waste drums. Self-shielding of interrogating neutrons by lumps of fissile material can lead to severe underestimates of fissile content derived from active assays. This can be a significant effect even for lumps with masses less than 1 gram.

Since backgrounds are measured during the active assay, unexpected changes in backgrounds may change the precision of the measurement, but will not result in measurement bias. Spontaneous fission and (alpha,n) neutrons from the sample are the primary contributors to the background for active counts; contributions from cosmic rays and room background neutrons are important at very low fissile loadings.

DISCUSSION

Second Screening Campaign

On March 16, 17, and 20, 1989, 147 55-gallon drums of M-Area lead-oil solids, received from Buildings 709-4G and 710-U, were screened for 235-U content in order to meet the 2 nCi/g transportation criterion^{10,11}. The "Pink Drum" was assayed each day as the first and last data acquisition. The active portion of the "Pink Drum" assay provides the certification of the active system through its known 235-U content and acceptable active mass limits⁵. The calibration of the PAN for 235-U screening was done on March 16, 1989 using a 0.3071 g 93% 235-U foil furnished by M-Area personnel⁴. The (0.3071 g U) foil was placed in a 55-gallon drum of clean synthetic waste and assayed each day before the 55-gallon drums of lead-oil solids were assayed.

In addition to the "Pink Drum" the 55-gallon drum of synthetic waste and an empty 55-gallon drum were assayed to determine the minimum detectable limits (MDL). The average counts/2000 pulses in the active signal region (70 u-sec - 270 u-sec) of eleven assays was 70.6 +/- 7 counts at a one sigma standard deviation. The minimum detectable count (MDC)/2000 pulses in the active signal region was defined as two times the active signal average count. This was calculated to be 141 counts/2000 pulses in the active signal region as a conservative estimate to flag any suspect drums, thus not taking credit for the three sigma standard deviation. The minimum detectable mass (MDM) for 235-U was calculated to be 0.07 grams¹¹.

DRAFT

Calculating the three-sigma MDC would give a MDC of 183 counts/2000 pulses⁶. This in turn would give a 0.09 gram 235-U MDM. So for the positive PAN assay results identified by EG&G in Table I drums 303, 422, and 149 are below the MDM for the PAN.

After evaluating the shielded active signal (SHASIG), the shielded active background (SHABK), the ratios between the SHASIG/SHABK, the Absorber index (AI) and the matrix correction factor (MCFA) in Table I, and additional raw screening data, the remaining eleven drums have positive results for 235-U above the MDM.

Third Screening Campaign

On June 5, 6, and 7, 1989, 180 30-gallon drums of repacked M-Area lead-oil solids, received from Buildings 709-4G and 710-U, were screened for 235-U content in order to meet the 2 nCi/g transportation criterion^{10,12}. The "Pink Drum" was assayed each day as the first and last data acquisition. The active portion of the "Pink Drum" assay provides the certification of the active system through its known 235-U content and acceptable active mass limits³. The calibration of the PAN for 235-U screening was done on June 5, 1989 using a 0.3071 g 93% 235-U foil furnished by M-Area personnel⁴. The (0.3071 g U) foil was placed in a 30-gallon drum of clean, synthetic waste and assayed each day before the 30-gallon drums of lead-oil solids were assayed.

The 30-gallon drum of synthetic waste and an empty 30-gallon drum were assayed to determine the MDL. The average counts/2000 pulses in the active signal region (70 u-sec - 270 u-sec) of thirteen assays was 60.2 +/- 8 counts at a one sigma standard deviation. The MDC/2000 pulses in the active signal region was defined as two times the active signal average count. This was calculated to be 120 counts/2000 pulses in the active signal region as a conservative estimate to flag any suspect drums, thus not taking credit for the three sigma standard deviation. The MDM for 235-U was calculated to be 0.04 grams¹².

Calculating the three-sigma MDC would give a MDC of 168 counts/2000 pulses. This in turn would give a 0.06 gram 235-U MDM. So for the positive PAN assay results identified by EG&G in Table II drum 336 is below the MDM for the PAN.

After evaluating the SHASIG, SHABK, the ratios between the SHASIG/SHABK, the AI and the MCFA in Table II, and the raw screening data, the remaining nine drums have positive results for 235-U above the MDM. The 30% bias low for the .29g 235-U standard is due to the system being designed to assay 55 gallon drums, but the results do no impact the 2 nCi/g screening limit.

DRAFT

SUMMARY

One-hundred and forty-seven drums were assayed as 55-gallon drums. Eleven of the 55-gallon drums still have positive 235-U screening results above the MDM after evaluating the data. These eleven drums were then repackaged into 24 30-gallon drums and were not screened before shipping them offsite. Ninety drums that were not screened as 55-gallon drums were repackaged into 30-gallon drums that were screened during the third and fourth screening campaign. Nine of the 30-gallon drums that were shipped offsite still have positive screening results above the MDM after evaluating the data.

REFERENCES

1. Code of Federal Regulations, 49 CFR 173.403.
2. "Analysis of 320-M Drums for U-235 Content", A. Gibbs to S.J. Mentrup, DPSP-88-422-2, August 30, 1988.
3. "The Los Alamos Second-Generation System for Passive and Active Neutron Assay of Drum-Size Containers", J.T. Caldwell et.al., LA-10774-MS, September 1986.
4. "Experimental TRU Waste Assay Facility (ETWAF) Sensitivity Check", M.K. Marsh to J.D. Kuhns, September 1, 1988.
5. "Experimental TRU Waste Assay Facility (ETWAF) Meeting", M.K. Marsh to J.D. Kuhns, August 8, 1988.
6. "Capability and Limitation Study of the DDT Passive-Active Neutron Waste Assay Instrument", N.J. Nichols et.al., LA-12237-MS, May 1992.
7. "Number of Drums Of Lead-Oil Assayed by PAN Verses Number of Drums Shipped Offsite", G.P. Froidl to D.J. Zecha, October 30, 1992.
8. "EG&G, Idaho Request For Status of Waste Drums Analyzed By Passive-Active Neutron Analysis", G.P. Froidl to D.J. Zecha, September 11, 1992, Rev. 1.
9. Letter, Virgil W. Sauls to R.C. Shank, October 19, 1992.
10. "Purpose Of Analysis of 320-M Drums For U-235 Content", J.D. Kuhns to M.B. Hughes, April 5, 1989
11. "Analysis Of 320-M Drums for U-235 Content", J.D. Kuhns to V.B. Wheeler, DPSP-89-422-4, March 22, 1989.
12. "Analysis Of 320-M Drums for U-235 Content", J.D. Kuhns to V.B. Wheeler, ESH-AL-891021, June 12, 1989.

DRAFT**ATTACHMENTS**

1. Table I Key
2. Table I - EG&G Identified 55-Gallon Drum PAN Screening Results, March 16, 1992 - March 20, 1992.
3. Table II Key
4. Table II - EG&G Identified 30-Gallon Drum PAN Screening Results, June 5, 1992 - June 7, 1992.
5. Table III - Listing of Container Numbers with Positive 235-U Screening Results above the PAN MDM.

DRAFT**Table I Key**

Drum #	The number assigned to the drum by Waste Management/ Vendor.
55GALCM	55-gallon drum of clean synthetic material.
.29gSTD	The 55-gallon drum of clean synthetic material with the 0.3071 gram 93% 235-U foil placed inside and assayed.
COMP #	The composite number assigned by Waste Management.
SCREEN DATE	The date that the drum was screened on the PAN.
235-U g	The 235-U mass in grams detected by the PAN.
nCi/g, U	Nanocuries of uranium per gram of lead-oil solids
SHASIG	The Shielded Active Signal in counts (70 u-sec to 270 u-sec)
SHABK	The Shielded Active Background in counts (570 u-sec to 1570 u-sec)
AI	Absorber index
MCFA	Matrix correction factor
SHTOT	Shielded totals is the sum of neutrons detected from all shielded detector packages during the 200 second passive mode.
SYSTOT	System totals is the number of neutrons detected in the 200 second passive mode, irrespective of whether the source neutrons are coincident, non-coincident, or both. This is a measurement quantity and resulting from the summation of both shielded and bare detector packages.
Drum #	The drum is below the 0.09g 235-U MDM for the PAN.

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Table 1 - Identified 55-Gallon Drum PAN Screening Results

DRUM #	COMP #	SCREEN DATE	U-235 g	nCi/g, U	SHASIG	SHABK	SHTOT	SYSTOT	AI	NCFA
55GALCH		3/16/89	0.01		84	46	402	1888	4.9069	1.4305
55GALCH		3/16/89	0.00		64	54	376	1830	4.9450	1.4373
55GALCH		3/16/89	0.01		77	42	389	1922	5.5720	1.5462
55GALCH		3/16/89	0.00		63	38	357	1839	4.9782	1.4432
.29g STD		3/16/89	0.30		637	53	328	1889	5.5192	1.5373
.29g STD		3/16/89	0.31		661	51	346	1898	5.2126	1.4844
.29g STD		3/16/89	0.31		641	60	409	1922	5.5423	1.5412
*303	H 24	3/16/92	0.08	<0.1	310	43	350	1888	2.2623	1.0000
299	H 24	3/16/92	0.51	<0.1	1694	60	351	1781	2.6761	1.0000
55GALCH		3/17/89	0.01		72	39	316	1768	5.3194	1.5029
.29 g STD		3/17/89	0.27		559	46	357	1792	5.7722	1.5800
440	H 25	3/17/89	0.10	<0.1	312	45	283	1701	4.5332	1.3628
*422	H 25	3/17/89	0.08	<0.1	355	51	314	1726	2.9406	1.0457
428	H 25	3/17/89	0.12	<0.1	500	50	265	1628	2.1393	1.0000
319	H 26	3/17/89	0.46	<0.1	1714	61	366	1907	1.8349	1.0000
524	H 26	3/17/89	1.30	<0.1	4110	101	394	1991	2.4225	1.0000
431	H 26	3/17/89	0.10	<0.1	385	54	372	1787	2.1828	1.0000
*149	H 27	3/17/89	0.08	<0.1	345	52	386	1810	2.0420	1.0000
298	H 27	3/17/89	0.20	<0.1	672	69	397	1796	2.4476	1.0000
357	H 27	3/17/89	2.78	<0.1	9328	117	433	2115	1.7776	1.0000
55GALCH		3/20/89	0.01		71	41	382	1819	5.3965	1.5162
.29 g STD		3/20/89	0.22		490	55	355	1850	5.2418	1.4895
250	H 29	3/20/89	0.12	<0.1	457	66	407	1869	2.3948	1.0000
58	H 29	3/20/89	0.20	<0.1	648	50	404	1769	2.1058	1.0000
#3	H 29	3/20/89	0.18	<0.1	625	65	308	1841	2.3724	1.0000

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Table II Key

Drum #	The number assigned to the drum by Waste Management/ Vendor.
30GALCM	30-gallon drum of clean synthetic material.
.29gSTD	The 30-gallon drum of clean synthetic material with the 0.3071 gram 93% 235-U foil placed inside and assayed.
COMP #	The composite number assigned by Waste Management.
SCREEN DATE	The date that the drum was screened on the PAN.
235-U g	The 235-U mass in grams detected by the PAN.
nCi/g, U	Nanocuries of uranium per gram of lead-oil solids.
SHASIG	The Shielded Active Signal in counts (70 u-sec to 270 u-sec)
SHABK	The Shielded Active Background in counts (570 u-sec to 1570 u-sec)
AI	Absorber index
MCFA	Matrix correction factor
SHTOT	Shielded totals is the sum of neutrons detected from all shielded detector packages during the 200 second passive mode.
SYSTOT	System totals is the number of neutrons detected in the 200 second passive mode, irrespective of whether the source neutrons are coincident, non-coincident, or both. This is a measurement quantity and resulting from the summation of both shielded and bare detector packages.
*Drum #	The drum is below the 0.06g 235-U MDM for the PAN.

Table II - Identified 30-Gallon Drum PAN Screening Results

DRUM #	COMP #	Screen Date	U-235 g	nCi/g, U	SHASIG	SHASK	SH101	SYST01	AI	MCFA
30GALCH		6/5/89	0.00		55	59	445	2453	1.8749	1.0000
.29 g STD		6/5/89	0.19		810	58	424	2403	1.8677	1.0000
315	M 31	6/5/89	0.09	<0.1	446	62	406	2402	2.0629	1.0000
356	M 31	6/5/89	0.09	<0.1	370	57	442	2424	1.7234	1.0000
.29 g STD		6/5/89	0.20		855	51	457	2510	1.9173	1.0000
.29 g STD		6/5/89	0.19		811	54	461	2491	1.9206	1.0000
*336	M 33	6/5/89	0.04	<0.1	239	74	379	2311	2.5040	1.0000
.29 g STD		6/5/89	0.19		796	67	422	2404	1.9341	1.0000
30GALCH		6/6/89	0.00		64	62	416	2140	1.4975	1.0000
.29g STD		6/6/89	0.21		851	57	372	2156	1.9940	1.0000
382	M 34	6/6/89	0.06	<0.1	288	59	418	2181	1.2953	1.0000
396	M 34	6/6/89	0.17	<0.1	669	55	398	2142	2.1763	1.0000
395	M 34	6/6/89	0.29	<0.1	1174	67	440	2213	2.3137	1.0000
.29 g STD		6/6/89	0.20		842	63	424	2266	2.0117	1.0000
383	M 35	6/6/89	0.09	<0.1	394	54	388	2143	2.1750	1.0000
30GALCH		6/7/89	0.00		75	44	447	2315	1.9772	1.0000
.29 g STD		6/7/89	0.21		864	78	444	2301	1.9141	1.0000
466	M 35	6/7/89	0.11	<0.1	476	57	432	2327	2.1400	1.0000
465	M 36	6/7/89	0.23	<0.1	982	75	437	2356	1.9431	1.0000
.29 g STD		6/7/89	0.20		836	80	416	2283	2.0311	1.0000
467	M 37	6/7/89	0.12	<0.1	531	72	409	2313	2.4111	1.0000
.29 g STD		6/7/89	0.20		856	71	429	2356	2.0058	1.0000

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DRAFTTable III

Listing of Container Numbers with Positive U-235 Screening Results
above the PAN MDM:

55-GALLON DRUM NUMBERS

299
440
428
319
524
431
298
357
250
58
#3

30-GALLON DRUM NUMBERS

315
356
382
396
395
383
466
465
467

OSR 3-4A-W (Rev 1-89)

ATTACHMENT II

DRAFT**WESTINGHOUSE SAVANNAH RIVER COMPANY
INTER-OFFICE MEMORANDUM**

November 6, 1992

WER-SWD-920572

TO: R. C. Shank, 724-7E

FROM: G. P. Froidl, 724-7E, 7-5624 *GPF***OFFSITE SHIPMENT OF HAZARDOUS WASTE (LETTER, O'REAR TO CIOFFL 08-26-92)**

Ref 1: "Don't Say It - Write It," G. P. Froidl to L. L. Goforth, September 11, 1992.

Ref 2: Letter, Virgil W. Sauls to R. C. Shank, October 19, 1992.

INTRODUCTION

Three shipments of lead-oil solids were made in 1989 from the Savannah River Site (SRS) to the Chemical Waste Management (CWM) incinerator in Chicago. The inquiry into the offsite shipment of this waste stream on the part of EG&G, Idaho prompted intensive study of the shipping records for these three shipments. This study noticed several problems with the paperwork that made it difficult to study and research these records. Since the possibility of other inquiries subsequent to the EG&G inquiry exists, it was determined that resolution to these problems was needed. It seemed prudent to state these problems and resolutions in a separate record, rather than make corrections in the shipping records. Therefore, Ref 1 was written to clarify the information in the records, state the problems, state possible resolutions to those problems, and, hopefully, optimize the efforts of those conducting a subsequent study.

As requested in Ref 2, this letter provides the best possible resolutions to the problems stated in Ref 1. Copies of the shipping manifests for these three shipments of lead-oil solids are provided in Attachment 1.

RESOLUTION

Virtually all of the problems noted in Ref 1 are transcription errors made when transferring information from one set of records to another. The complex numbering system that evolved during the preparation of these drums for shipment offsite needs to be emphasized. By the time the drums were actually shipped offsite, each drum had four different numbers associated with it:

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1. The "Log Number" assigned by Waste Management upon receipt of the waste at the Hazardous Waste Storage Facility (HWSF).
2. The number assigned by Rollins Environmental Services (RES) while staging the 55-gallon drums for shipment.
3. The number assigned by CWM while repackaging the 55-gallon drums into 30-gallon drums for shipment offsite.
4. The composite number assigned when the drums were analyzed by passive-active neutron (PAN) analysis. (Note that "composite" is used in a manner different from its typical definition in radiometric analysis. Typically, "composite" refers to a composite sample made by combining representative samples from two or more waste containers. For the PAN analyses, however, "composite" refers to a campaign of drums that were assayed on the same day; each drum was analyzed, not a composite sample.)

During the PAN assay process, 147 55-gallon drums were assayed under the RES number. These drums were assayed in March, 1989, repackaged by CWM into 30-gallon drums in May, 1989, and most of them were shipped offsite on 6/5/89. The 30-gallon drums from these 147 55-gallon drums were not reassayed. The remaining 55-gallon drums were repackaged by CWM into 30-gallon drums before being assayed. Many of them were assayed during the first week of June, 1989 and shipped offsite on 6/12/89. The remaining 30-gallon drums were assayed in August, 1989 and shipped offsite on 9/1/89. Therefore, on the following tables, RES numbers refer to 55-gallon drums and CWM numbers refer to 30-gallon drums.

The following drums are not recorded in any of the three shipping records as having been shipped offsite:

RES drum 168. PAN assay composite M25. Resolution: Not repackaged by CWM. Preliminary inventory indicates that RES drum 168 is still in storage. Storage/shipment status will be noted during next inventory.

RES drum 117. PAN assay composite M25. Resolution: Not repackaged by CWM. Preliminary inventory indicates that RES drum 117 is still in storage. Storage/shipment status will be noted during next inventory.

RES drum 405. PAN assay composite M26. Resolution: Repackaged into CWM drums 16 and 17. Preliminary inventory indicates that CWM drums 16 and 17 have been shipped offsite. Storage/shipment status will be noted during next inventory.

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Attachment 2 provides resolutions to the problems in the shipping records for the 6/5/89 shipment. Attachment 3 provides resolutions to the problems in the shipping records for the 6/12/89 shipment and 9/1/89 shipment.

Please contact me at x7-5624 for further assistance.

:gpf

Attachments

cc: J. V. Cioffi, 724-7E*
L. C. Thomas, 724-7E*
J. G. Sonnenberg, 724-7E*
L. T. Reid, 724-9E*
D. J. Zecha, 724-9E
L. L. Goforth, 724-7E
G. L. Jackson, 724-7E
T. Boerstler, 724-7E
WME File, 703-H
File Code WM 186.10

*w/o Attachments

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ATTACHMENT 2

RESOLUTIONS TO PROBLEMS ON THE 6/5/89 SHIPMENT

**DRUM NUMBER
(RES-CWM)****PROBLEM AND RESOLUTION**

134-269	Problem with composite number on "Offsite Drum Listing": CWM binder shows CWM drum 269 as being packaged from RES drum 139 not RES drum 134. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded drum 139-269 as 134-269. RES drum 134 was assayed on composite M27 and repackaged into CWM drums 74 and 75. RES drum 139 was assayed on composite M24 and repackaged into CWM drums 269 and 270. Composite M24 is the correct composite for drum 139-269.
136-231	Problem with composite number on "Offsite Drum Listing": composite for drum 136-261 recorded as composite M27, but PAN assay results and CWM binder record composite as M24. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded composite as M27 rather than M24. RES drum 136 was assayed on composite M24 and repackaged into CWM drums 231 and 232.
136-232	Problem with composite number on "Offsite Drum Listing": composite for drum 136-232 recorded as composite as M25, but PAN assay results and CWM binder record composite as M24. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded composite as M25 rather than M24. RES drum 136 was assayed on composite M24 and repackaged into CWM drums 231 and 232.
125-234	Problem with composite number on "Offsite Drum Listing": composite for drum 125-234 recorded as composite as M25, but PAN assay results and CWM binder record composite as M24. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded composite as M25 rather than M24. RES drum 125 was assayed on composite M24 and repackaged into CWM drums 233 and 234.
238-141
238-142
238-143
238-198
238-199	Problem with RES drum number on "Offsite Drum Listing" and in CWM binder: RES drum 238 is listed five times with two different composite numbers. Resolution: Transposition error in "Offsite Drum Listing" and in CWM binder: incorrectly recorded RES drum 328 as 238 when repackaging and when preparing "Offsite Drum Listing". RES drum 238 was assayed on composite M29 and repackaged into CWM drums 141, 142, and 143. RES drum 328 was assayed on composite M25 and repackaged into CWM drums 198 and 199, but the numbers were apparently transposed as 238-198 and 238-199 when recorded in the CWM binder and on the "Offsite Drum Listing."

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ATTACHMENT 2 (cont'd)

RESOLUTIONS TO PROBLEMS ON THE 6/5/89 SHIPMENT

DRUM NUMBER (RES-CWM)	PROBLEM AND RESOLUTION
117-8	Problem with RES drum number on "Offsite Drum Listing": CWM binder shows CWM drum 8 as packaged from RES drum 119 not RES drum 117. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded drum 119-8 as 117-8. RES drum 119 was assayed on composite M27 and repackaged into CWM drums 6 and 8.
258-161	Problem with composite number on "Offsite Drum Listing": composite for drum 258-161 recorded as composite as M25, but PAN assay results and CWM binder record composite as M29. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded composite as M25 rather than M29. RES drum 258 was assayed on composite M29 and repackaged into CWM drums 160, 161, and 162.
263-61	Problem with RES drum number on "Offsite Drum Listing": CWM binder shows CWM drum 61 as being packaged from RES drum 363 not RES drum 263. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded drum 363-61 as 263-61. RES drum 363 was assayed on composite M26 and repackaged into CWM drums 60 and 61.
231-96 231-97	Problem with RES drum number on "Offsite Drum Listing": CWM binder shows CWM drums 96 and 97 as being packaged from RES drum 281, not RES drum 231. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded drums 281-96 and 281-97 as 231-96 and 231-97. RES drum 281 was assayed on composite M26 and repackaged into CWM drums 96 and 97.
148-30	Problem with composite number on "Offsite Drum Listing": composite for drum 148-31 recorded as composite as M26, but PAN assay results and CWM binder record composite as M27. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded composite as M26 rather than M27. RES drum 148 was assayed on composite M27 and repackaged into CWM drums 28, 29, and 30.
211-14	Problem with RES drum number on "Offsite Drum Listing": CWM binder shows CWM drum 14 as being packaged from RES drum 219 not RES drum 211. RES drum 211 is not listed on any PAN assay results. Resolution: Transcription error on "Offsite Drum Listing": incorrectly recorded drum 219-14 as 211-14. RES drum 219 was assayed on composite M26 and repackaged into CWM drums 14 and 15.

DRAFT**ATTACHMENT 2 (cont'd)**
RESOLUTIONS TO PROBLEMS ON 6/5/89 SHIPMENT**DRUM NUMBER**
(RES-CWM)**PROBLEM AND RESOLUTION**

- 750-76 Problem with RES drum number on "Offsite Drum Listing": CWM binder shows CWM drum 76 as being packaged from RES drum 150 not RES drum 750. RES drum 750 is not listed on any PAN assay results. **Resolution:** Transcription error on "Offsite Drum Listing": incorrectly recorded drum 150-76 as 750-76. RES drum 150 was assayed on composite M27 and repackaged into CWM drum 76.
- 1-165 Problem with composite number on "Offsite Drum Listing": composite for drum 1-165 recorded as composite as M27, but PAN assay results and CWM binder record composite as M29. **Resolution:** Transcription error on "Offsite Drum Listing": incorrectly recorded composite as M27 rather than M29. RES drum 1 was assayed on composite M29 and repackaged into CWM drum 165.
- 157-35 Problem with RES drum number on PAN assay results: hand-written "Sample Data Sheet" lists a drum 157, but not a drum 151. The hand-written and typed PAN assay results list a drum 151, but not a 157. **Resolution:** Transcription error on either the "Sample Data Sheet" or on the PAN assay results. Both numbers refer to the same drum which was assayed on composite M27 and repackaged into CWM drums 34 and 35.
- 296-59 Problem with composite number on "Offsite Drum Listing": composite for drum 296-59 recorded as composite as M27, but PAN assay results and CWM binder record composite as M26. **Resolution:** Transcription error on "Offsite Drum Listing": incorrectly recorded composite as M27 rather than M26. RES drum 296 was assayed on composite M26 and repackaged into CWM drums 59 and 62.
- 362-22 Problem with composite number on "Offsite Drum Listing": composite for drum 362-22 recorded as composite as M27, but PAN assay results and CWM binder record composite as M26. **Resolution:** Transcription error on "Offsite Drum Listing": incorrectly recorded composite as M27 rather than M26. RES drum 362 was assayed on composite M26 and repackaged into CWM drums 22 and 23.

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ATTACHMENT 2 (cont'd)
RESOLUTIONS TO PROBLEMS ON 6/5/89 SHIPMENT

DRUM NUMBER
(RES-CWM)

PROBLEM AND RESOLUTION

292-79

Problem with RES drum number on PAN assay results: hand-written "Sample Data Sheet" lists a drum 292, but not a drum 291. The hand-written and typed PAN assay results list a drum 291, but not a 292. **Resolution:** Transcription error on either the "Sample Data Sheet" or on the PAN assay results. Both numbers refer to the same drum which was assayed on composite M27 and repackaged into CWM drums 79 and 80.

121-230

Problem with composite number on "Offsite Drum Listing": composite for drum 121-230 recorded as composite as M27, but PAN assay results and CWM binder record composite as M24. **Resolution:** Transcription error on "Offsite Drum Listing": incorrectly recorded composite as M27 rather than M24. RES drum 121 was assayed on composite M24 and repackaged into CWM drums 229 and 230.

311-382
RES drum 331

Problem with CWM drum number on "Offsite Drum Listing" and with RES drum number on typed PAN assay results: CWM binder records RES drum 311 as being repackaged into CWM drums 281 and 282, composite M24; typed PAN assay results list a RES drum 331 but hand-written "Sample Data Sheet" and hand-written PAN assay results for M24 list a drum 311 not a drum 331. **Resolution:** Transcription error on "Offsite Drum Listing" and on typed PAN assay results: incorrectly recorded drum 311-282 as 311-382 on "Offsite Drum Listing"; RES drum 311 was incorrectly typed as RES drum 331 on typed PAN assay results. RES drum 311 was assayed on M24 and repackaged into CWM drums 281 and 282.

DRAFT**ATTACHMENT 3****RESOLUTION TO PROBLEMS ON 6/12/89 And 9/1/89 SHIPMENTS****DRUM NUMBER
(RES-CWM)****PROBLEM AND RESOLUTION**

- 287-449 Problem with composite number on "Offsite Drum Listing" and in CWM binder: composite for drum 287-449 recorded as composite M34, but PAN assay results list drum 449 with composite M36. **Resolution:** Transcription error on "Offsite Drum Listing" and in CWM binder: incorrectly recorded composite as M34 rather than M36. Drum 287-449 was assayed on M36 and shipped offsite on 6/12/89.
- 305 (RES number not listed.) Problem with CWM drum number on "Offsite Drum Listing": hand-written "Sample Data Sheet" and the hand-written PAN assay results show a CWM drum 304, but not a CWM drum 305. **Resolution:** Transcription error on "Offsite Drum Listing": incorrectly recorded CWM drum 304 as 305. CWM drum 304 and was assayed on composite T28 and shipped offsite on 9/1/89. **Note: This is not a lead-oil solids drum: it is a 1,1,1 trichloroethane drum.**
- 486 (RES number not listed.) Problem with CWM drum number on "Offsite Drum Listing": CWM drum 485 is listed twice: once with composite M39 and once with composite M41. **Resolution:** Transcription error on "Offsite Drum Listing": incorrectly recorded CWM drum 486 as 485. CWM drum 485 was assayed on composite M39. CWM drum 486 was assayed on M41 and shipped offsite on 9/1/89.

Appendix G

Evaluation of Positive Gamma Analytical Results

INTEROFFICE CORRESPONDENCE

Date: November 25, 1992
To: L. A. Page, MS 3960
From: T. C. Sorensen, MS 7111 *TCS*
Subject: EVALUATION OF "EXPLANATIONS OF POSITIVE GAMMA PHA ANALYTICAL RESULTS" ESH-ALW-92-0030 DATED OCTOBER 30, 1992 - TCS-28-92

A document numbered ESH-ALW-92-0030 titled "Explanations of Positive Gamma PHA Analytical Results" was submitted to the Data Analysis and Management Section of the Radiation Measurements Laboratory (RML) for an evaluation. The document was reviewed by experienced RML gamma spectroscopists.

It is the opinion of the reviewers that the narrative and discussion of positive gamma analytical results does support the supposition in report #ESH-ALW-92-0030 that positive gamma results are probably "false-positive" results. Our evaluation is based solely on the limited information provided in the report.

One element of concern is the data reduction method (computer analysis of data) utilized by the Savannah River Technology Center-Environmental Technology Section. As stated in the report, "SRS depends upon the computer reduction of data which include some false-positive results" before data results are reported. This method of reporting data, with no further reviews, is a potentially indefensible practice. From a quality assurance point of view, additional reviews by qualified and trained gamma spectroscopy personnel would eliminate reporting of "false-positive" results or justify any reporting of "true-positive" results.

jd

cc: C. E. Casey, MS 3960
L. D. Koeppen, MS 7111 *dk*
Central Files, MS 1651
T. C. Sorensen File

DRAFT**WESTINGHOUSE SAVANNAH RIVER COMPANY
WASTE ANALYSIS SECTION****ESH-ALW-92-0030****CC: WSRC****J.G. Donnan, 772-3F****A. Gibbs, 707-C****W.R. Jacobsen, 703-10C****J.G. Sonnenberg, 724-7E****W.G. Winn, 779-9A****WME File: 703-H****File Code: WM 186.10****DOE****S.R. Ross, 703-A****TO: D.J. Zecha, 724-9E****October 30, 1992****FROM: S.T. Nichols, 724-7E (STN)****Explanations of Positive Gamma PHA Analytical Results****Scope**

In 1987 the Savannah River Technology Center-Environmental Technology Section (SRTC-ETS) developed screening technology to insure paint and solvent wastes could be shipped off-site in compliance with the Department of Transportation's 2nCi/g total activity limit.¹ In September 1989, Analytical Laboratories adopted the screening technology developed by SRTC-ETS and began radiometric screening analyses of non-radioactive hazardous waste (NRHW) to be shipped off-site for disposal. On April 30, 1990, the Department of Energy - Savannah River (DOE-SR) issued a moratorium on the shipment of Savannah River wastes generated inside Radiologically Controlled Areas (RCA's) to off-site commercial treatment, storage, and disposal facilities. On May 17, 1991, a moratorium on the shipment of hazardous wastes generated inside RCA's was placed on all DOE sites. An audit team from EG&G Idaho is investigating SRS shipment records to ensure only NRHW was shipped. As requested by EG&G Idaho this memorandum summarizes suspect positive gamma spectroscopy analytical results contained in Attachment I.

Methods

All radiometric screens were conducted to provide compliance with the 2nCi/g total activity limit set by the Department of Transportation (DOT) for non-radioactive shipment classification per CFR 173.403.² Gamma spectroscopy measurements were conducted using high purity germanium detectors. The detectable gamma-ray spectrum was typically 0.050 to 2.000 MeV. Gamma Pulse Height Analyses (PHA) provided a qualitative and quantitative evaluation of sample activity. Standards used to calibrate the gamma PHA's are traceable to the National Institute of Standards and Technology (NIST).

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2

Limitations of Gamma Spectroscopy

While the principle of gamma-ray spectroscopy is very simple, the interpretation of gamma-ray spectra is often complex. Historically, the data reduction of gamma-ray spectra has been conducted by experienced people who could recognize and compensate for various gamma-ray interactions. The data reduction routines used in SRS systems are designed for simple radionuclides having no interactions with the shielding or detector, perfect background subtraction, and no interferences. Gamma-ray counting relies upon subtraction of the background to determine the true activity of the sample. Gamma-ray counting of very low level radioactivity, even using special shielding and detector materials, is particularly difficult because of the stability of counting hardware over the long counting times needed to obtain reliable results. Statistically, over time, slight shifts in the gain of amplifiers due to temperature, voltage fluctuations, etc. can and do result in background subtracted spectra having peaks which are artifacts of the counting and data reduction system.

Another phenomena which complicates interpretation of gamma-ray spectra is that gamma-rays from radionuclides such as the natural uranium and thorium chains, interact with shielding and detector material and backscatter into the lower energies, resulting in Compton interference, which can obscure radionuclide gamma-ray peaks. Bremsstrahlung and x-ray induced interactions are particularly intense in the low energy range of < 0.150 MeV where many nuclides have their only detectable gamma-ray peaks. None of these interactions are compensated for by the standard data reduction libraries and programs because they are system dependent.

The gamma-ray spectrum from radionuclides which emit gamma rays with energies in excess of 1.022 MeV may exhibit spectral artifacts known as "escape peaks." A photon with energy above 1.022 MeV may release its energy into the detector material by creating an electron-positron pair. The positron of this pair will annihilate with an electron in the detector to produce two 0.511 MeV photons. One or both of these 0.511 MeV photons may escape the detector producing a spectral line at either the original photon energy minus 0.511 MeV (single escape peak) or at the original energy minus 1.022 MeV (double escape peak). The Th-232 chain, for example, which occurs naturally in the Savannah River-Horsecreek Valley area, has pair production peaks at 2.10 and 1.59 MeV due to the escape of one and two 0.511 MeV annihilation gamma-rays from Tl-208 (2.61 MeV peak). Tl-208 also emits a 0.511 MeV gamma-ray. A slight gain shift can result in misinterpretation of the 0.511 MeV peak as Ru-106 (0.512 MeV) or some other radionuclide. If expert perusal time of all the spectra was available, anomalies such as these would be identified by their peak shapes and other spectral characteristics and removed from the data reduction. As experts are not normally used for these routine samples, SRS depends upon the computer reduction of data which include some false positive results.

When U-235 gamma spectroscopy measurements are conducted special considerations should be noted: both U-235 and Ra-226 produce 0.186 MeV gammas which are indistinguishable by gamma spectrometry. Thus, the gamma spectra have been analyzed with both U-235 and Ra-226 taking full credit for this gamma-ray. Such a practice flags the possibility that some U-235 is detected, but also leaves open the possibility that the activity is due to Ra-226. If the activity were due only to Ra-226, one might expect to also detect similar activities for some of its daughter products (Bi-214 and Pb-214); however, this is rather unlikely because Ra-226 initially decays to Ra-222 (3.8 day half-life), which is a noble gas that may readily escape from the waste before many subsequent

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daughter radionuclides are created. Thus, Ra-226 normally has an activity several times greater than its detectable daughters. For the analyses that show Ra-226 to be consistent with the above considerations, it can be deduced that U-235 may not be present. Consistent with this, it is considered that the low levels of reported U-235 imply that Ra-226 (not U-235) was actually present.³

Discussion

SRS is primarily a production site for Pu-238, Pu-239 and tritium. As such, the only materials subject to irradiation by the reactors have been enriched uranium, depleted uranium, lithium, Np-237, aluminum, and stainless steel. There were a few runs many years ago to produce Co-60 and Cf-252, but materials from these runs have long been removed. Therefore, the most probable radionuclide products which can occur at SRS are the fission products from enriched uranium and products formed by thermal neutron irradiation of the depleted uranium, lithium, Np-237, aluminum, and stainless steel. There is no charged particle production of isotopes at SRS. These factors limit the possible radionuclides that need to be searched for by identification libraries at SRS. The reason improbable nuclides have not been removed from the gamma-ray libraries is that standards and sources used for detector calibration are purchased off-site and often contain these nuclides. Purchased standards and sources which can contain nuclides that are not produced at SRS are controlled by a source control program to prevent their presence in nonradioactive waste streams.

At SRS, production techniques do not focus on the separation of parent-daughter nuclides in waste, so if a parent is present in the spectra, its daughter activity should typically be present also. If the relationship is such that the parent could have all decayed, leaving the daughter activity only, there is usually some other associated activity which should be present if the gamma-ray is real. Again, the computer system is not yet sophisticated enough to deal with all of these relationships.

So, for the suspect radionuclides identified by EG&G Idaho in Attachment I, Table I (pages 8-11) is constructed to provide explanations for positive gamma PHA results:

Table I Key

- A. Records indicate no use in RCA
- B. Not a probable product at SRS
- C. No daughter detected or no parent detected
- D. Background radiation / Indistinguishable from global fallout
- E. Duplicate sample analysis did not detect suspect radionuclide
- F. No associated nuclide which should have been present
- G. Statistics of counting and background subtraction
- H. Indistinguishable from Naturally Occurring Radioactive Material peak energy

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Expanded Composite Discussion

The following composite discussions are provided to illustrate limitations of gamma spectroscopy and present facts for selected composites from Attachment I to support Table I; "Explanations of Positive Gamma PHA Results".

Composite: 0002A
Sample Id: 484
Manifest #: 1208441

Suspect Nuclide / Activity:
Co-57 / .451 nCi/g

Composite 0002A illustrates limitations of gamma spectroscopy. In the crane lube oil analyzed December 14, 1990, Co-57 was the only man-made radionuclide detected. While conducting the record search an additional gamma PHA analysis of composite 0002A was found. The analysis was conducted under virtually identical conditions (i.e., same instrument, lab, geometry, and count time etc.) on December 13, 1990. The analysis contains no detected man-made radionuclides. Copies of the 12/13/90 and 12/14/90 analyses are included as Attachment II for comparison.

Composite: 11,15,16,17
Sample Id: N/A
Manifest #: 1035009, 1035103,
1035014, 1035015.

Suspect Nuclides / Activity:
Co-60 / 3.0E-5 nCi/g max
Cs-137 / 1.9E-4 nCi/g max

Composites 11, 15, 16, and 17 were analyzed during the 1987 method development period by SRTC-ETS. Only Co-60 and Cs-137 were detected as man-made radionuclides in composites 11,15,16, and 17. Co-60 was detected at a maximum of 3.0E-5 nCi/g. When compared with 48 other composites analyzed (during method development period) only two composites detected Co-60, both of which were near minimum detectable levels. The Co-60 values obtained are consistent with being false positives from statistical considerations and indicate marginal detectability. Accordingly, no convincing evidence exists to affirm SRS-produced Co-60 in composites 11 and 16.³

Detected Cs-137 activity is comparable to activity levels found in area soils detected in "134Cs/137Cs Scoping Study for Identifying SRS Deer (U)." ⁴ This study measured Cs-137 activity in soils on SRS and at off-site locations one-hundred miles from SRS to be $4 - 7 \times 10^{-4}$ nCi/g and $2 - 10 \times 10^{-4}$ nCi/g, respectively. Cs-137 values in waste ranged from 1.5×10^{-5} nCi/g to 1.9×10^{-4} nCi/g. Measured Cs-137 values in composites 15, 16, and 17 are less than values found in soils at SRS and off-site surroundings. Measured values were recorded to be conservative and illustrate marginal detection at best. Thus, the Cs-137 detected in the shipped waste cannot be distinguished from world-wide Cs-137 in weapons fallout. Consequently, no evidence exists to affirm that SRS-produced Cs-137 existed in composites 15, 16, and 17.

Composite: 128-89
Sample Id: 128
Manifest #: 1163976

Suspect Nuclides / Activity:
U-235 / 5.22E-3 nCi
Cs-137 / 6.80E-3 nCi

In the hardened adhesives waste U-235 and Cs-137 were detected radionuclides. An explanation for the positive U-235 result is outlined on page two of this document. The explanation indicates the possibility that Ra-226, not U-235 may be responsible for the positive U-235 activity in composite 128-89.

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Cs-137 was detected at 6.80×10^{-3} nCi. This particular gamma PHA result sheet dated 01/04/90 does not include the sample weight. By looking at gamma PHA analyses conducted at the same lab prior to and after 01/04/90, a reasonable estimate of the sample weight can be made (i.e., counting procedures generally count consistent geometries which hold a relatively consistent sample weight). On 10/9/89 sample BSR-4 (#34) had a sample weight of 505.4g, while sample SREL-LW-90-01 dated 08/22/90 documented sample weight as 420g. To further support the idea of estimating sample weight, the first page of the analysis states a required sample volume of 300 mL. A sample volume of 300 mL agrees with approximate sample weights of at least 300 grams. To be conservative, assume that only 100g of sample were counted during the analysis of composite 128-89. Cs-137 specific activity would be 6.80×10^{-5} nCi/g. This value is an order of magnitude lower than Cs-137 activity in soils on SRS and at off-site locations one-hundred miles from SRS 4; $4 - 7 \times 10^{-4}$ nCi/g and $2 - 10 \times 10^{-4}$ nCi/g, respectively. Cs-137 activity in composite 128-89 is less than values found in soil from global fallout. Furthermore, in reviewing a second gamma PHA scan of composite 128-89 conducted 12/28/89 no man-made radionuclides were detected. U-235 was listed as $< 5.95 \times 10^{-3}$ nCi (" $<$ " means less than minimum detectable activity) and Cs-137 at $< 1.24 \times 10^{-2}$ nCi. Note that the minimum detectable activities for U-235 and Cs-137 are logical considering a count time of 360 minutes (12/28/89 analysis) versus a 1333 min count (01/04/90 analysis). A copy of the 12/28/89 and 01/04/90 analyses are included as Attachment III. The absence of U-235 and Cs-137 in composite 128-89 is also supported by the fact that the waste did not originate from an RCA. Consequently, no evidence exists to affirm that SRS-produced Cs-137 existed in composite 128-89.

Composite: MS-66
Sample Id: 124
Manifest #: 1208379, 1208380

Suspect Nuclides / Activity:
Cd-109 / $6.2E-1$ nCi
Eu-155 / $7.6E-2$ nCi
Sb-125 / $1.0E-1$ nCi
Ru-106 / $4.3E-1$ nCi

Composite MS-66 provides an additional example of the limitations of gamma spectroscopy. In the construction waste enamel composite MS-66 the following man-made radionuclides were detected: Cd-109, Eu-155, Sb-125, and Ru-106. The analysis was conducted 12/27/89 using a six hour count time. In conducting a record search of composite MS-66 an additional gamma PHA analysis conducted January 15, 1990 was found. This gamma PHA was counted under virtually identical conditions (i.e., same lab, instrument, count time, etc.). The 01/15/90 analysis result did not indicate detected Cd-109, Eu-155, Sb-125 nor Ru-106 in composite MS-66. A copy of the January result is provided as Attachment IV. Furthermore, records document composite MS-66 did not originate in an RCA. Consequently, evidence does not indicate SRS produced Cd-109, Eu-155, Sb-125 nor Ru-106 existed in composite MS-66.

Copies of analysis reports for composites MS-98 (Sample ID 134, Attachment V) and MS-265 D-41 (Sample ID 217, Attachment VI) are provided to support Table I. These composites were incorrectly identified on Attachment I to contain suspect nuclides; Be-7 and Cs-137, respectively.

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Summary

Gamma PHA results representing the suspect list of man-made radionuclides shown in Attachment I contain positive values which do not conclude waste containing SRS added radionuclides was sent off-site. Logical explanations (Table I) illustrate multiple reasons which show why positive results could have occurred. By looking at parent daughter relationships, gamma-ray energies, duplicate sample analyses, global fallout, isotope production at SRS, RCA use and the limitations of gamma spectroscopy a thorough evaluation of the suspect positive gamma PHA results was made. Table I contains eleven radionuclides for which SRS does not have a primary means of production. Only four composites in Table I indicated RCA use. In composites 11, 15, 16, and 17, which did originate from an RCA, detected Co-60 activity illustrates marginal detection and measured radionuclide values are consistent with statistical false positives. Detected Cs-137 is shown to be at levels that cannot be discriminated from global fallout in soils located one-hundred miles from SRS.

Composite MS-218, which detected Nb-95, illustrates inconsistent parent daughter detection. Since the half-life of Zr-95 is 65 days and the half-life of Nb-95 is 35 days, its logical that Nb-95 would probably not be detected in the absence of its parent Zr-95. In support of the limitations of gamma spectroscopy, composites 0002A and MS-66 are examples in which samples were analyzed twice under virtually identical conditions (i.e., same lab, instrument, geometry, count time, etc.). In composite 0002A Co-57 was detected on one occasion and undetected on the next. In composite MS-66 a similar situation occurred for detected Cd-109, Eu-155, Sb-125 and Ru-106. These examples reflect that, since all radioactive screens were conducted as a validation step to insure compliance with the DOT 2nCi/g limit, time was not focused on reanalyzing every sample. Consequently, Attachment I does not show SRS-produced man-made radionuclides were shipped to Louisiana.

References

1. "Analysis of Paint/Solvent Waste for Off-Plant Disposal", W.L. McDowell and W.G. Winn, DPST-88-536, May 5, 1988.
2. Code of Federal Regulations, 49 CFR 173.403.
3. "Review of Waste Shipments Conducted in 1987", W.G. Winn, SRTC-ETS-92-224, September 2, 1992.
4. "¹³⁴Cs/¹³⁷Cs Scoping Study for Identifying SRS Deer (U)", W.G. Winn to R.W. Taylor, WSRC-TR-90-95, Feb 12, 1990.
5. "EG&G ORTEC Systems Application Studies", William H. Zimmer, PSD No. 14, March 1980.
6. "Table of Isotopes", C.M. Lederer, J.M. Hollander, and I. Perlman, Sixth edition.
7. EG&G Ortec ADCAM Master Library, Version 4.01, January 23, 1987.
8. "The Gamma Rays of Radionuclides", Gerhard Erdmann and Werner Soyka, Volume 7, 1979.

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Attachments

1. "Composites That Require Explanation Of Positive Gamma Analytical Results, Louisiana Manifests", L. Page (EG&G Idaho) to D. Zecha (SRS), September 22, 1992.
2. Composite 0002A, Gamma PHA results, December 13 & 14, 1990.
3. Composite 128-89, Gamma PHA result, December 28, 1989.
4. Composite MS-66, Gamma PHA result, January 14, 1990.
5. Composite MS-98, Gamma PHA result, April 2, 1990.
6. Composite D-41, Gamma PHA result, March 26, 1991.

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TABLE I Explanations of Positive Gamma PHA Results (see pg 3 for key)

Composite	Suspect Isotope(s)	Reason for Misidentification	Justification	RCA	Highlights/Comments
0002A	Co-57	G	A,B,E,F	No	All peaks < 0.136 MeV, See ATT 2
11	Co-60	G	F,G	Yes	Statistical false positive
15	Cs-137	D	F	Yes	Cs-137 < Global Fallout
16	Cs-137	D	F	Yes	Cs-137 < Global Fallout
	Co-60	G	F,G	Yes	Statistical false positive
17	Cs-137	D	F	Yes	Cs-137 < Global Fallout
17-BE1BE2	U-235	H	A	No	Indistinguishable from Ra (186 keV)
	Cs-137	D	A,F	No	Cs-137 < Global Fallout
18-C1	Ba-140	G	A,C,F	No	No La-140 detected
	Nb-95	G	A,C,F	No	No Zr-95 detected
34-BSR4	U-235	H	A	No	Indistinguishable from Ra (186 keV)
	Cs-137	D	A,F	No	Cs-137 < Global Fallout.
125 CDWPF	Co-57	G	A,B,F	No	All peaks < 0.136 MeV
128-89	U-235	H	A,E	No	Indistinguishable from Ra (186 keV)
	Cs-137	D	A,E,F	No	Cs-137 < Global Fallout, see ATT 3
BE-5	Ce-139	G	A,B	No	Not a probable product at SRS
BSR-107	Ce-139	G	A,B	No	Not a probable product at SRS
	Sn-113	G	A,B	No	Not a probable product at SRS
	Sb-125	G	A,F	No	No Cs-137 detected
	Ru-103	G	A,F	No	No Ru-106 detected
BSR-108	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Ce-141	G	A,F	No	No Ce-144 detected, all peaks < 0.145 MeV
BSR-85	Cd-109	G	A,B	No	All peaks < 0.085 MeV
C-67	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Ce-139	G	A,B	No	Not a probable product at SRS
	Sr-85	G	A,B	No	Annihilation radiation nearby
C-6713	Cr-51	G	A,F	No	No other neutron activation products
C-69	Ce-141	G	A,F	No	No Ce-144 detected, all peaks < 0.145 MeV
C-85	Zr-95	G	A,C	No	No daughter Nb-95 detected
D-157	Co-57	G	A,B,F	No	All peaks < 0.136 MeV
MC-42	Cd-109	G	A,B	No	All peaks < 0.085 MeV

"##" All peaks for activity calculation had bad shape.

TABLE 1 Explanations of Positive Gamma PHA Results (see pg 3 for key)

Composile	Suspect Isotopes (s)	Reason for Misidentification	Justification	RCA	Highlights/ Comments
MS-10	U-235	H	A	No	Indistinguishable from Ra (186 keV)
MS-41	U-235	H	A	No	Indistinguishable from Ra (186 keV)
	Cs-137	D	A,F	No	Cs-137 < Global Fallout
MS-50	U-235	H	A	No	Indistinguishable from Ra (186 keV)
MS-66	Cd-109	G	A,B,E	No	All peaks < 0.085 MeV, see ATT 4
	Eu-155	G	A,E	No	All peaks < 0.105 MeV
	Sb-125	G	A,E,F	No	No Cs-137 detected
	Ru-106	G	A,C,E	No	No daughter Rh-106 detected
MS-70	Hg-203	G	A,B	No	Not a probable product at SRS
	Mn-54	G	A,B,F	No	No Co-60 detected
MS-74	Sn-113	G	A,B	No	Not a probable product at SRS
MS-78	Cd-109	G	A,B	No	All peaks < 0.085 MeV
	Eu-154	G	A,F	No	No Cs-137 detected
MS-98	Be-7	n/a	n/a	No	No Be-7 detected, See analysis report ATT 5
MS-99	Eu-155	G	A	No	All peaks < 0.105 MeV
	Nb-95 #	G	A,C,F	No	No Zr-95 detected
	Zn-65	G	A,B,F	No	No Co-60 detected
MS-105 (1-2)	Cd-109	G	A,B	No	All peaks < 0.085 MeV
	Eu-155	G	A	No	All peaks < 0.105 MeV
MS-105 (3-4)	Ce-139	G	A,B	No	Not a probable product at SRS
MS-105 (5-6)	Cd-109	G	A,B	No	All peaks < 0.085 MeV
	Eu-155	G	A	No	All peaks < 0.105 MeV
MS-105 (7)	Cd-109	G	A,B	No	All peaks < 0.085 MeV
	Ce-144	G	A,F	No	All peaks < 0.134 MeV
	Cr-51 #	G	A, F	No	All Cr-51 peaks had bad shape
MS-105 (8)	Cr-51	G	A,F	No	No Co-60 detected
MS-136	Ce-144	G	A,F	No	All peaks < 0.134 MeV, No Cs-137 detected
MS-142	Eu-155	G	A	No	All peaks < 0.105 MeV
	Ce-144	G	A,F	No	All peaks < 0.134 MeV, No Cs-137 detected
	Sn-113	G	A,B	No	Not a probable product at SRS
	Sc-46	G	A,B	No	Not a probable product at SRS
MS-155	Cd-109	G	A,B	No	All peaks < 0.085 MeV

All peaks for activity calculation had bad shape.

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TABLE I Explanations of Positive Gamma PHA Results (see pg 3 for key)

Composite	Suspect Isotopes (s)	Reason for Misidentification	Justification	RCA	Highlights/ Comments
MS-173	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Zn-65	G	A,B,F	No	No Co-60 detected
MS-214	Sn-113	G	A,B	No	Not a probable product at SRS
MS-217	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Ce-144	G	A,E,F	No	All peaks < 0.134 MeV, No Cs-137 detected
	Ce-141	G	A,E	No	All peaks < 0.145 MeV
MS-218	Eu-155	G	A	No	All peaks < 0.105 MeV
	Ce-144	G	A,F	No	All peaks < 0.134 MeV, No Cs-137 detected
	Nb-95	G	A,C	No	No Zr-95 detected
MS-223	U-235	H	A	No	Indistinguishable from Ra (186 keV)
MS-222	Ce-139	G	A,B	No	Not a probable product at SRS
	Sb-125	G	A,F	No	No Cs-137 detected
	Be-7 #	G	A,B	No	All Be-7 peaks had bad shape
	Sb-124	G	A,B	No	Not a probable product at SRS
MS-231	Ce-144	G	A,F	No	All peaks < 0.134 MeV, No Cs-137 detected
	Ce-141	G	A	No	All peaks < 0.145 MeV
MS-236-3	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Ce-139	G	A,B	No	Not a probable product at SRS
MS-239	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Sn-113	G	A,B	No	Not a probable product at SRS
MS-250	Cd-109	G	A,B	No	All peaks < 0.085 MeV
MS-252	I-131	G	A,F	No	No Ba-140 or Ce-144 detected
MS-259	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Mn-54	G	A,B	No	Not a probable product at SRS
MS-265 D22	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Sr-85	G	A,B	No	Annihilation radiation nearby
	Sc-46	G	A,B	No	Not a probable product at SRS
MS-265 D24	Co-57	G	A,B	No	All peaks < 0.136 MeV
MS-265 D25	Hg-203	G	A,B	No	Not a probable product at SRS
MS-265 D26	Cd-109	G	A,B	No	All peaks < 0.085 MeV
MS-265 D27	Cd-109	G	A,B	No	All peaks < 0.085 MeV

All peaks for activity calculation had bad shape.

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TABLE I Explanations of Positive Gamma PHA Results (see pg 3 for key)

Composite	Suspect Isotopes (s)	Reason for Misidentification	Justification	RCA	Highlights/ Comments
MS-265 D28	Ce-144	G	A,F	No	All peaks < 0.134 MeV, No Cs-137 detected
	Hg-203	G	A,B	No	Not a probable product at SRS
MS-265 D29	Mn-54	G	A,B	No	Not a probable product at SRS
MS-265 D30	Hg-203	G	A,B	No	Not a probable product at SRS
MS-265 D32	Cd-109	G	A,B	No	All peaks < 0.085 MeV
MS-265 D35	Ce-144	G	A	No	All peaks < 0.134 MeV
	Ce-139	G	A,B	No	Not a probable product at SRS
	Cs-134	G	A	No	Not a probable product at SRS
	Cs-137	D	A	No	Specific activity = $6.59E-5$ nCi/g < global fallout
MS-265 D39	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Hg-203	G	A,B	No	Not a probable product at SRS
MS-265 D41	Cs-137	n/a	n/a	No	No Cs-137 detected see analysis report ATT 6
MS-265 D42	Co-57	G	A,B	No	All peaks < 0.136 MeV
	Ce-139	G	A,B	No	Not a probable product at SRS
	Ru-103	G	A,F	No	No Ru-106 detected
MS-265 D44	Ce-144	G	A,F	No	All peaks < 0.134 MeV, No Cs-137 detected
	Hg-203	G	A,B	No	Not a probable product at SRS
MS-265 D45	Cd-109	G	A,B	No	All peaks < 0.085 MeV
	Ce-139 #	G	A,B	No	All Ce-139 peaks had bad shape
MS-269	Cd-109	G	A,B	No	All peaks < 0.085 MeV
	Ce-144	G	A,F	No	All peaks < 0.134 MeV, No Cs-137 detected
TF-9	Eu-155	G	A	No	All peaks < 0.105 MeV
	Eu-154	G	A,F	No	No Cs-137 detected
	Sb-125 #	G	A,F	No	No Cs-137, All Sb-125 peaks had bad shape
	Sb-124	G	A,B	No	Not a probable product at SRS
WSO187	Co-57	G	A,B	No	All peaks < 0.136 MeV

*# All peaks for activity calculation had bad shape.

DRAFT**ATTACHMENT I**

**COMPOSITES THAT REQUIRE EXPLANATION OF POSITIVE GAMMA ANALYTICAL RESULTS,
LOUISIANA MANIFESTS:**

COMPOSITE	MANIFESTS	NUCLIDES(pci)	TOTAL pci/g
0002A	1208441	CO-57(170)	
11	1035013	CO-60(0.032)	
15	1035009	CS-137(0.11)	
16	1035009, 1035014	CS-137(0.015), CO-60(0.027)	
17	1035009, 1035014, 1035015	CS-137(0.19)	
17-BE18E2	1208427	U-235(7.4), CS-137(6)	
18-C1	1163982	BA-140(307), NB-95(38)	0.71
34-BGR4	1163777	U-235 (9.5), CS-137(12.9)	
123 COWP	1164168	CO-57(30)	0.14
128-89	1163976	U-235(5.2), CS-137(6.8)	0.025 pci/g
BE-5	1208379	CE-139(35)	0.09
BSR-107	1208446	CE-139, SN-113, SB-125, RU-103	
BSR-108	1208443	CO-57(20), CE-141(30)	
BSR-85	1208446	CO-109 (500)	
C-67	1208434	CO-57, CE-139, SR-95	
C-6713	1208436	CR-51(216)	
C-69	1208436	CE-141(20)	
C-85	1208435	ZR-95(180)	0.44
D-157	1163885	CO-57(20)	0.037
MC-42	1208376	CO-109(802)	1.8
MS-10	1208387, 1208429	U-235(6.8)	0.016
MS-41	1208446	U-235(5), CS-137(8)	
MS-50	1208396	U-235(6.4)	
MS-66	1208379, 1208380	CO-109, EU-155, SB-125, RU-106	
MS-70	1208443, 1208378, 1208380	HG-203(10), NN-54(20)	0.067
MS-74	1208442	SN-113(40)	
MS-78	1208396	CO-109(644), EU-154(63)	
MS-98	1208441, 1208442	SE-7(162)	
MS-99	1208444	EU-155, NB-95, ZN-65	
MS-105 (1-2)	1208443	CO-109(100), EU-155(140)	
MS-105 (3-4)	1208443	CE-139(30)	
MS-105 (5-6)	1208443	CO-109, EU-155	
MS-105 (7)	1208443	CO-109, CE-144, CR-51	
MS-105 (8)	1208443	CR-51(390)	
MS-136	1208379	CE-144	
MS-142	1208379	EU-155, CE-144, SN-113, SC-46	
MS-155	1208435	CO-109(180)	0.32
MS-173	1207430	CO-57(80), ZN-65(50)	0.32
MS-214	1208433	SN-113(66.9)	
MS-217	1208378	CO-57, CE-144, CE-141	
MS-218	1208378	EU-155, CE-144, NB-95	
MS-223	1208429	U-235(5.3)	
MS-222	1208431	CE-139(11), SB-125(104), SE-7(331), SB-124(51)	1.1
MS-231	1208435	CE-144(170), CE-141(20)	
MS-236-3	1208436	CO-57(270), CE-139(20)	0.8
MS-239	1208436	CO-57(230), SN-113(80)	0.9
MS-250	1208436	CO-109(500)	

INFORMATION ONLY DRAFT

EG&G ORTEC

(1)AN1-AN2 12.04.13 26-MAR-91 21:06:12 Page 1

SPECTRUM
SAMPLE.SPCACQUISITION STARTED
26-MAR-91 15:01:00.00LIVE
21600REAL
21630

SAMPLE

D-41

WEIGHT (g): 431.3

DATE: 03-26-91

BADGE #: 247826707

FILE: WML217.SPC

VALIDATION

DATE

6/9/91

PAGE

3

OF 4

RECORD ID

217

DETECTOR SYSTEM

Detector is model GEM-10175-P serial no. 21tp10006a
bias volt 3000 V POS

CALIBRATION

CALIBRATION FILENAME: 001001.CLB

CREATED: 12-MAR-91 11:51:4

NIST STD REF MAT 4276B

1200 EST MAY 1, 1983, EU-154, 155, SB-125

FIRST LIBRARY FILE GAMMA.LIB

START= 50; STOP= 3995; SENS(%)= 20.0; FACTOR= .2702703E-01

***** SUMMARY OF NUCLIDES IN SAMPLE *****

NUCLIDE	TIME OF COUNT ACTIVITY Nanocuries	PERCENT UNCERTAINTY COUNTING 1 S
PB-210	< 2.2E-01	
TH-234	< 1.2E-01	
CD-109	< 1.5E+00	
TH-234	< 1.2E-01	
EU-155	< 1.7E-01	
CO-57	< 1.7E-02	
EU-154	< 6.0E-02	
AC-228	< 1.0E-01	
CE-144	< 5.9E-01	
U-235	< 6.2E-03	
CE-141	< 6.8E-03	
CE-139	< 1.3E-02	
RA-226	< 7.0E-01	
PB-212	< 6.1E-02	
RN-219	< 1.7E-01	
HG-203	< 1.8E-02	
PB-214	< 1.6E-02	
CR-51	< 8.7E-02	
I-131	< 7.7E-03	
SN-113	< 2.1E-02	
AC-228	< 1.0E-01	
SB-125	< 2.4E-02	

INFORMATION ONLY

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EG&G ORTEC

(1)AN1-AN2 I2.04.13 02-APR-90 14:58:25 Page 2

ATTACHMENT VI

BE-7 < 1.5E-01
 LA-140 < 2.3E-02
 RU-103 < 1.2E-02
 TL-208 < 1.3E-02
 SR-85 < 1.9E-02
 BA-140 < 6.6E-02
 SB-125 < 2.5E-02
 SB-124 < 5.5E-02
 BI-214 < 2.3E-02
 RU-106 < 1.0E-01

~~CS-134 < 2.6E-02~~

ZR-95 < 6.5E-02
 BI-212 < 4.0E-01
 NB-95 < 2.0E-02
 CS-134 < 1.3E-02
 MN-54 < 2.0E-02
 SC-46 < 1.6E-02
 Y-88 < 2.5E-02
 ZN-65 < 6.7E-02

~~CS-134 < 1.3E-02~~

~~CS-134 < 1.3E-02~~

~~CS-134 < 1.3E-02~~

ANNIH < 8.5E-03
 DE2614 < 6.9E-02
 TH-228 < 3.6E-02

***** SUMMARY *****

TOTAL ACTIVITY: ~~1.1E-01~~

ELAPSED TIME: 77.44 SECONDS

NET.SPC UFO.UFO F 0 0

INFORMATION ONLY

AS4-3-90

UKAFI

EG&G ORTEC

(1)AN1-AN2 12.04.13 02-APR-90 14:58:25 Page 1

SPECTRUM
SAMPLE.SPCACQUISITION STARTED
02-APR-90 08:55:00.00LIVE
21600REAL
21626

SAMPLE

*~~XXXXXXXXXX~~ WEIGHT (g): 518.2DATE: ~~XXXXXXXXXX~~ BADGE #: 237901057 FILE: ~~XXXXXXXXXX~~**DETECTOR SYSTEM**Detector is model GEM-10175-P serial no. 21tp10006a
bias volt 3000 V POS**CALIBRATION**

CALIBRATION FILENAME: 001001.CLB

CREATED: 23-MAR-90 13:31:3

NIST STD REF MAT 4276-B

1200 EST MAY 1, 1983 EU-154,155 SB-125

FIRST LIBRARY FILE GAMMA.LIB

START= 50; STOP= 3995; SENS(%)= 20.0; FACTOR= .2702703E-01

***** SUMMARY OF NUCLIDES IN SAMPLE *****

NUCLIDE	TIME OF COUNT ACTIVITY Nanocuries	PERCENT UNCERTAINTY COUNTING 1 S
PB-210	< 1.2E+00	
TH-234	< 2.9E-01	
CD-109	< 8.2E-01	
TH-234	< 1.5E-01	
EU-155	< 3.2E-02	
CO-57	< 1.6E-02	
EU-154	< 7.5E-02	
AC-228	< 5.3E-02	
CE-144	< 1.2E-01	
XXXXXXXXXX		
CE-141	< 2.0E-02	
CE-139	< 9.9E-03	
RA-226	< 5.2E-01	
XXXXXXXXXX		
RN-219	< 1.7E-01	
HS-203	< 1.8E-02	
PB-214	< 7.2E-02	
CR-51	< 1.3E-01	
I-131	< 1.7E-02	
SN-113	< 1.9E-02	
AC-228	< 5.3E-02	
SB-125	< 2.5E-02	

INFORMATION ONLY
ATTACHMENT V 15 AS
DRAFT

ESK6 DTECO (1) ON1-ON2 12.06.13 ~~14-08-90~~ 14:40:42 Page 2

EE-7	1.524E-01	17.1
LA-140	< 6.8E-02	
HU-103	< 9.2E-03	
TL-202	< 2.2E-02	
GR-25	< 1.7E-01	
KA-140	< 3.6E-07	
SR-125	< 2.8E-02	
SR-124	< 5.4E-02	
BT-214	< 1.4E-01	
HU-105	< 1.0E-01	
CS-137	< 1.2E-02	
ZR-95	< 6.7E-01	
BI-212	< 4.2E+00	
NB-75	< 1.2E-02	
CS-134	< 1.7E-02	
MN-54	< 2.1E-02	
SC-46	< 1.7E-02	
V-88	< 3.7E-02	
ZN-65	< 1.7E+00	
CO-60	< 2.8E-02	
K-40	< 3.3E+01	
FEBIX	< 6.9E-03	
ANNIH	< 4.2E-03	
DEC614	< 7.4E-02	
TH-228	< 6.1E-02	

***** SUMMARY *****
TOTAL ACTIVITY: .162376

ELAPSED TIME: 72.06 SECONDS
NET.SPC UFO.UFO F 0 0

INFORMATION ONLY

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15 AS

EDMS ORTED

(1)AN1-AN2 12.04.13 14-JAN-90 14:40:42 Page 1

SPECTRUM
SMPLE.SPCACQUISITION STARTED
14-JAN-90 08:38:00.00LIVE
21600REAL
21427

SAMPLE

MS66 Const. Waste Enamel

WEIGHT (g): 473.0

DATE: 01-15-90

BADGE #: 247826707

FILE: WML124.SPC

DETECTOR SYSTEM

Detector is model GEN-10175-P serial no. 21tp10006a
bias volt 3000 V POS

CALIBRATION

CALIBRATION FILENAME: 001001.CLB

CREATED: 22-DEC-89 14:41:4

NIST STD REF MAT 4275-B

1300 EST MAY 1, 1983

FIRST LIBRARY FILE C:\QB\GAMMA.LIB

START= 50; STOP= 3995; SENS(%)= 20.0; FACTOR= 1.2702703E-01

***** SUMMARY OF NUCLIDES IN SAMPLE *****

NUCLIDE	TIME OF COUNT ACTIVITY Nanocuries	PERCENT UNCERTAINTY COUNTING 1 S
FR-210	< 3.9E-01	
TH-234	< 1.2E+00	
CO-109	< 7.8E-01	
TH-234	< 1.4E-01	
EU-155	< 9.2E-02	
CO-57	< 1.1E-02	
EU-154	< 5.1E-02	
AC-228	< 1.0E-01	
CE-144	< 9.1E-02	
U-238		
CE-141	< 1.6E-02	
CE-139	< 1.1E-02	
RA-226	< 3.1E+00	
FR-212	< 6.6E-02	
RN-219	< 1.0E-01	
HG-203	< 1.7E-02	
FR-214	< 7.7E-01	
CR-51	< 1.0E-01	
I-131	< 1.3E-02	
SN-113	< 1.4E-02	
AC-228	< 1.0E-01	
SR-125	< 2.5E-02	

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(1)ANI-AN2 12.04.13 28-DEC-89 22:58:04 Page 2

ATTACHMENT IV

GE-7	< 2.9E+00
LA-140	< 1.2E+00
RU-103	< 3.4E-01
TL-208	< 4.7E-01
SR-85	< 3.2E-01
BA-140	< 1.3E+00
SB-123	< 7.1E-01
SB-124	< 2.5E+00
BI-214	< 2.2E+01
RU-106	< 4.0E+00
CS-137	< 4.6E-01
ZR-95	< 2.4E+00
BI-212	< 3.1E+01
NB-95	< 4.5E-01
CS-134	< 3.7E-01
MN-54	< 1.1E+00
SC-46	< 5.0E-01
Y-88	< 9.1E-01
ZN-65	< 1.7E+00
CO-60	< 6.3E-01
K-40	< 2.5E+01
PBR1KX	< 2.6E-01
ANNIH	< 1.6E-01
DE2614	< 1.7E+00
TH-228	< 1.3E+00

< 1.2E-2 nCi

***** SUMMARY *****

TOTAL ACTIVITY: .000000 :

ELAPSED TIME: 70.37 SECONDS

NET.SPC UFO.UFO F 0 0

37Bg = 1nCi

Sample ID# 129-85 Co-90Count Time (min) 1333Sample Weight (g) Date 1-4-93

INFORMATION ONLY

Isotope	Peak	Area	Rtg	Net CPM	ZZ	Total Activity (nCi)	Concentration (nCi/g)	Det
U-235	135.2	265		201		5.22 E-03		
Pb-212	238.0	183						
Pb-214	294.6	68						
Ac-228	337.9	63						
Pb-214	351.6	73						
Bi-208	582.9	146						
Bi-214	609.0	91						
Cs-137	661.3	69		031		6.90 E-03		
Ac-228	911.1	25						
Ac-228	969.0	34						
Bi-214	1120.4	31						
K-40	1460.9	80						
Bi-214	1763.0	46						

Anthony L. Jones

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GAG ORTEC

1)AN1-AND 12.04.13 14-DEC-90 14:39:31 Page 2

ATTACHMENT III

E-7	< 7.2E-02
A-140	< 4.0E-02
U-103	< 9.3E-03
L-208	< 1.5E-02
R-85	< 1.7E-02
A-140	< 3.6E-02
S-115	< 2.5E-02
S-124	< 7.1E-02
I-114	< 3.2E-02
U-106	< 1.5E-00
S-137	< 1.9E-02
R-95	< 3.7E-01
I-212	< 3.7E+00
S-95	< 1.2E-02
S-134	< 2.4E-01
N-54	< 2.4E-02
C-46	< 1.3E-02
-88	< 3.7E-02
N-65	< 4.4E-01
U-60	< 2.4E-02
-40	< 1.2E+00
BRKX	< 3.6E-02
NNIH	< 1.5E-02
E2614	< 4.8E-02
H-228	< 4.1E-02

***** SUMMARY *****

TOTAL ACTIVITY: XXXXXXXXXX

LAPSED TIME: 74.00 SECONDS

ET.SPC UFO.UFO F 0 0

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INFORMATION ONLY

1566 CATED 11-04-13 14-DEC-90 14:29:31 Page 1

SPECTRUM ACQUISITION STARTED 14-DEC-90 08:35:00.00
LIVE 21600
REAL 21428

SAMPLE
WEIGHT (g): 376.4
BADGE #7: 247826707
FILE: [REDACTED]

DETECTOR SYSTEM
Detector is Model GEN-1017S-F Serial no. 216P100054
11-04-13 14:29:31

CALIBRATION
CALIBRATION FILENAME: 001001.CLB
CREATED: 11-DEC-90 12:24:14
1ST STD REF MAT 4276B
1200 EST MAY 1, 1983, EU-104, 155, SS-125

FIRST LIBRARY FILE GAMMA.LIB
START= 50; STOP= 3993; GENS(X)= 20.0; FACTOR= .2702702E-01
***** SUMMARY OF NUCLIDES IN SAMPLE *****

NUCLIDE TIME OF COUNT ACTIVITY PERCENT
Nucleides COUNTING 1 S

8B-210	< 2.2E-01
H-214	< 1.2E+00
UD-109	< 2.5E+00
H-234	< 3.7E-01
UD-165	< 2.9E-01
EU-154	< 2.0E-01
0-228	< 7.8E-02
SE-144	< 4.6E-02
A-235	< 5.9E-03
SE-141	< 1.5E-01
SE-159	< 3.7E-02
HA-226	< 3.0E-02
8B-219	< 1.0E-02
8B-203	< 8.4E-02
8B-214	< 8.0E-02
8B-51	< 5.7E-02
1-151	< 7.8E-03
8N-112	< 2.0E-02
0-228	< 7.8E-02
8B-125	< 2.5E-02

INFORMATION ONLY

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D&G DISTEC

(1)AN1-AN2 12.04.13 13-DEC-90 21:54:22 Page 2

E-7	< 1.5E-01
A-140	< 2.9E-01
U-103	< 1.2E-02
L-205	< 1.3E-02
A-35	< 1.6E-02
A-140	< 4.8E-02
B-123	< 2.5E-02
S-124	< 4.7E-02
I-214	< 2.0E-01
U-106	< 1.0E+00
S-137	< 3.4E-02
B-95	< 3.8E-01
I-212	< 2.3E+00
B-95	< 1.8E-02
S-134	< 2.6E-02
N-54	< 1.9E-02
C-46	< 1.9E-02
-88	< 2.4E-02
N-65	< 2.7E-01
D-60	< 1.7E-02
-40	< 1.9E-01
BBIKX	< 2.8E-02
NNIH	< 4.2E-03
E2614	< 2.7E-01
H-228	< 3.5E-02

***** SUMMARY *****

GTAL ACTIVITY: [REDACTED]

LAPSED TIME: 80.19 SECONDS

ET.SPD UFO.UFO F 0 0

INFORMATION ONLY

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GAG CRTES (1)AN1-AN2 12.04.13 13-DEC-90 21:54:28 Page 1

SPECTRUM ACQUISITION STARTED LIVE REAL
MPLC.SPC 13-DEC-90 15:50:00.00 21600 21630

SAMPLE ~~CRAN-1~~ AS 13-90
 not trace tube 0.1 WEIGHT 1g
 ATE: 12-13-90 BADGE #: 247826707 FILE: ~~CRAN-1~~

DETECTOR SYSTEM
 Detector is model GEN-10175-P serial no. 21tp10006a
 155 volt 3000 V POS

CALIBRATION
 CALIBRATION FILENAME: 001001.CLB
 CREATED: 11-DEC-90 12:24:4
 1ST STD REF MAT 4276B
 200 EST MAY 1, 1993, EU-154, 155, SB-125

1ST LIBRARY FILE GAMMA.LIB
 START= 50; STOP= 3995; SENS(%)= 20.0; FACTOR= .2702703E-01

***** SUMMARY OF NUCLIDES IN SAMPLE *****

NUCLIDE	TIME OF COUNT ACTIVITY Nanocuries	PERCENT UNCERTAINTY COUNTING 1 S
B-210	< 2.2E-01	
H-234	< 5.1E-01	
D-109	< 1.4E-01	
H-234	< 1.2E-01	
U-155	< 4.4E-02	
U-97	< 2.6E-02	
U-154	< 6.6E-02	
C-228	< 9.4E-02	
E-144	< 2.5E-02	
E-235	< 2.5E-02	
E-141	< 2.5E-02	
E-139	< 2.5E-02	
A-226	< 2.5E-02	
B-212	< 2.5E-02	
N-219	< 1.0E-01	
G-203	< 1.8E-02	
B-214	< 3.8E-02	
R-51	< 1.1E-01	
-131	< 9.9E-03	
N-113	< 1.0E-02	
C-228	< 9.4E-02	
B-125	< 2.5E-02	

INFORMATION ONLY

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EG&G ORTEC

(1)AN1-AN2 12.04.13 26-MAR-91 21:06:12 Page 2

BE-7	< 7.6E-02
LA-140	< 4.0E-02
RU-103	< 9.1E-03
TL-208	< 1.2E-02
SR-85	< 1.9E-02
BA-140	< 3.6E-02
SB-125	< 2.4E-02
SB-124	< 4.7E-02
BI-214	< 3.5E-02
RU-106	< 2.0E-01
CS-137	< 1.2E-02
ZR-95	< 7.2E-02
BI-212	< 3.3E-01
NB-95	< 2.6E-02
CS-134	< 2.4E-02
MN-54	< 1.9E-02
SC-46	< 1.3E-02
Y-88	< 2.4E-02
ZN-65	< 6.3E-02
CO-60	< 2.0E-02
K-40	< 6.7E-01
FBBIKX	1.275E-02
ANNIH	< 1.4E-02
DE2614	< 5.2E-02
TH-228	< 3.5E-02

VALIDATED

SRN

DATE 6/9/92

PAGE 4 of 4

RECORD ID 61912

19.5

***** SUMMARY *****

TOTAL ACTIVITY: .127477E-01

ELAPSED TIME: 79.04 SECONDS

NET.SPC UFO.UFO F 0 0

To:
Lisa Page

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DRAFT**ATTACHMENT II**

MS-252	1208436	I-131(40)	0.13
MS-259	1208387, 1208392	CO-57, MN-56	
MS-265 022	1163885	CO-57, SR-85, SC-46	
MS-265 024	1163885	CO-57	
MS-265 025	1163885	HQ-203	
MS-265 026	1163885	CD-109(607)	1.4
MS-265 027	1163885	CD-109	
MS-265 028	1163885	CE-144, HG-203	
MS-265 029	1163885	MN-56	
MS-265 030	1163885	HQ-203	
MS-265 032	1163885	CD-109	
MS-265 035	1163885	CE-144, CE-139, CS-134, CS-137	
MS-265 039	1163885	CO-57(250), HG-203(23)	0.65
MS-265 041	1163885	CS-137	
MS-265 042	1163885	CO-57(232), CE-139(20), AU-103(14)	0.62
MS-265 044	1163885	CE-144, HG-203	
MS-265 045	1163885	CD-109, CE-139	
MS-269	1208378	CD-109(1183), CE-144(108)	3.0
TF-9	1208431	EU-155, EU-156, SB-125, SB-124	
USD187	1208426	CO-57	

Appendix H

Definitions

Definitions

Conservative Estimate (CE) and Best Estimate (DE):

For each composite sample, a conservative estimate (CE) and a best estimate (BE) were made for the total concentration of radioactivity. Both liquid and solid phases were treated and incorporated into a general formula

$$E = (Fl \times Al) + (Cs \times Fs \times As)$$

where the parameters are:

E = either CE or BE, as appropriate

Fl = liquid fraction of sample

Al = activity for liquid fraction (nCi/g)

Cs = solids correction factor

Fs = solids suspension fraction of sample

As = activity for solids suspension fraction (nCi/g)

Here only two phases are represented in the formula. In some samples, the formula was extended to handle an additional liquid phase. The formula uses different values of Al, As, and Cs for CE and BE calculations.

CE uses pseudo-total Ap for activities Al and As, and a conservative correction Cs of 4. Ap would be the total activity if all the count rate were assumed to be tritium. The Cs of 4 corresponds to a 25% escape probability for 4.5 MeV alphas uniformly distributed within a solid sphere of density 1 g/cm³ and diameter of 200 μm.

BE uses actual total Aa for activities Al and As, and a correction Cs of 1. The Aa is an obvious selection; however, arguments for choosing Cs = 1 need to be reviewed. Here, a 53% escape probability is calculated for 5 MeV alphas uniformly distributed within a 100 μm sphere of density 1. However, any contamination for paint solids is likely to be distributed on the surface of the spheres, because the ultrasonic breakup of the paint solids should cause fractures along regions which had been exposed to potential contamination sources. If all activity is on the surface of the 100 μm spheres, the escape probability increases to 69%. The solids suspension contains > 60% liquid; thus if the alpha activity were distributed proportionally to the solid and liquid fractions, the effective alpha escape probability would be > 88%. The estimate should be even higher because 1) it is unlikely that all the activity is due to alphas (which have the shortest range in solids), 2) the typical liquid/solids ratio of >100 in the scintillation cocktail favors the activity to be in liquid, 3) many of the particles are likely to be much less than 100 μm in diameter, and 4) any internal solids activities are not likely to be from SRP sources and thus should contribute only a minor component from natural radiation. Adoption of Cs = 1 assumes that, taken together, each of these four additional factors contribute an average increase of only 3%.*

*Winn, W. G. and McDowell, W. L., "Analysis of Paint/Solvent Waste for Off-plant Disposal," DPST-88-536, May, 1988.