DOE/LLW-219

Mixed Waste Management Options: 1995 Update

Nancy Kirner
James Kelly
George Faison
Dave Johnson

Foster Wheeler Environmental Corporation
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Idaho National Engineering Laboratory
National Low-Level Waste Management Program
Lockheed Idaho Technologies Company, Inc.
Idaho Falls, Idaho 83415

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EXECUTIVE SUMMARY

In the original *Mixed Waste Management Options* (DOE/LLW-134) issued in December 1991, the question was posed, "Can mixed waste be managed out of existence?" That study found that most, but not all, of the Nation's mixed waste can theoretically be managed out of existence.

Four years later, the Nation is still faced with a lack of disposal options for commercially generated mixed waste. However, since publication of the original *Mixed Waste Management Options* report in 1991, limited disposal capacity and new technologies to treat mixed waste have become available. A more detailed estimate of the Nation's mixed waste also became available when the U.S. Environmental Protection Agency (EPA) and the U.S. Nuclear Regulatory Commission (NRC) published their comprehensive assessment, titled *National Profile on Commercially Generated Low-Level Radioactive Mixed Waste* (National Profile).

These advancements in our knowledge about mixed waste inventories and generation, coupled with greater treatment and disposal options, lead to a more applied question posed for this updated report: "Which mixed waste has no treatment option?"

Beyond estimating the volume of mixed waste requiring jointly regulated disposal, this report also provides a general background on the Atomic Energy Act (AEA) and the Resource Conservation and Recovery Act (RCRA). It also presents a methodical approach for generators to use when deciding how to manage their mixed waste. The volume of mixed waste that may require land disposal in a jointly regulated facility each year was estimated through the application of this methodology.

In general, this approach leads a generator through three mixed waste management options in order of cost-effectiveness: avoidance, treatment, and regulatory. For purposes of estimating mixed waste volumes requiring jointly regulated disposal, each waste listed in the National Profile was grouped according to waste stream. In all, 17 waste streams were identified. The waste stream data were then compared with each option with the ultimate goal of minimizing the volume of mixed waste that ultimately requires jointly regulated disposal.

Because of the expected advances in commercially available treatment, the volume of mixed waste that may require jointly regulated disposal estimated in this study is considerably lower than the estimates presented in the National Profile.

Although new technologies continue to decrease the amount of mixed waste requiring land disposal and assuming practices identified in 1990 are still valid, treatment for an estimated 118 cubic meters of mixed waste per year is not commercially available. Contributing factors for this lack of available treatment relate to the small volumes of unique waste streams and the relatively high concentrations of radioactivity present in most of the commercially generated untreatable wastes. An additional 10 cubic meters of mixed waste requiring jointly regulated disposal results from the residues derived from treated listed wastes and contributions from poorly characterized waste. Based on the data provided in the National Profile, it is estimated in this study that 128 cubic meters of mixed waste per year cannot be managed out of existence.

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GLOSSARY[1]

Absorption: Any process in which a liquid is held in the interstices of an absorbent material, such as water being held in a sponge.

Agreement State: A state that has assumed, by virtue of an agreement with the Nuclear Regulatory Commission, certain regulatory and licensing responsibilities of the Commission.

Characteristic waste: Waste that exhibits specific physical or chemical characteristics described in 40 CFR 261 Subpart C. Specific characteristics are ignitability, corrosivity, reactivity, and toxicity.

Class A waste: Low-level radioactive waste that has low concentrations of long- or short-lived radionuclides. Class A waste must be disposed of separately from Class B and C waste unless it meets rigorous waste form requirements to ensure stability. Institutional control of access for up to 100 years will permit disposal of Class A waste without special provisions for intruder protection.

Class B waste: Low-level radioactive waste that has intermediate concentrations of long- or short-lived radionuclides. Class B wastes must meet more rigorous waste form requirements to ensure stability. Institutional control of access for 100 years will permit disposal of Class B waste without special provisions for intruder protection.

Class C waste: Low-level radioactive waste that has the highest concentrations of long- or short-lived radionuclides. Class C wastes must meet rigorous waste form requirements to ensure stability and must be disposed of at a depth of at least 5 meters below the surface or must be disposed of with intruder barriers designed to protect against inadvertent intruders for at least 500 years.

Commercial low-level radioactive waste (LLW): Low-level radioactive waste generated by commercial nuclear power plants, manufacturing industries, hospitals, universities, and research institutions. LLW does not include defense industry low-level radioactive waste.

Compact region: With regard to low-level radioactive waste disposal, a formal agreement entered into by two or more states, pursuant to the Low-Level Radioactive Waste Policy Act of 1980, as amended, for the purpose of establishing and operating regional disposal facilities. Compact regions are ratified by the party state legislatures and the Congress. Compact Commissions are authorized to restrict the use of their disposal facilities to wastes generated within the compact region.

Decay: The spontaneous transformation of one nuclide into a different nuclide or into a different energy state of the same nuclide. During decay, the unstable radioactive nucleus releases energy or particles. The process results in a decrease, with time, in the number of original radioactive atoms in the sample. Also referred to as radioactive disintegration.

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1. Illinois Department of Nuclear Safety, *LLW 1989 Annual Survey Report,* Springfield, Illinois, 1990.

Filtration: A process of removing radioactive particles from liquid waste by filtering. Filtration media may include cellulosic fibers, diatomaceous earth, and activated carbon. In some cases, the filtered liquid can be recycled. Filtration may also be applied to the removal of contamination from air by using HEPA (high-efficiency particulate air) filters or other kinds of filters.

Generator: Any person or entity that produces or possesses LLW in the course of or incident to manufacturing, power generation, processing, medical diagnosis and treatment, research, education, or other activity.

Half-life: The time in which half of the atoms of a particular radioactive substance disintegrate to another nuclear form. Each radionuclide has a specific half-life. Measured half-lives vary from millionths of a second to billions of years. Also called physical half-life.

Hazardous waste: Waste designated as chemically or biologically hazardous by Environmental Protection Agency regulations (40 CFR 261). When hazardous waste is combined with low-level radioactive waste, the combination is known as mixed waste. Both the radiological and the toxic properties of mixed waste must be considered in its management and disposal.

Incineration: A thermal treatment comprised of several technologies that use heat to destroy organic wastes.

Ion-exchange resin: An organic polymer used in an ion exchange column to remove the soluble ions from a solution that is passed through the column. Such columns are commonly used in nuclear power plants to remove radioactive material from the circulating cooling water.

Liquid scintillation counting fluid: A chemical solution that produces light when bombarded with radiation; used in numerous applications such as diagnostic testing and research. These solutions are a major component of institutional low-level radioactive waste. Also see "Organic liquid."

Listed waste: Wastes defined in 40 CFR 261 Subpart D are assigned an alphanumeric identification number. Listed wastes are known as P, U, K, or F wastes.

Low-level radioactive waste (LLW): Radioactive waste other than uranium mining or mill tailings, spent nuclear fuel, high-level waste, or greater than Class C waste. Low-level radioactive wastes contain radionuclides emitting primarily beta or gamma radiation and less than or equal to 100 nanocuries per gram of transuranic elements.

Mixed waste: Waste that contains a combination of low-level radioactive waste and hazardous materials. Hazardous components are those listed by the Environmental Protection Agency in Subpart D of 40 CFR 261, or those that exhibit any of the following four hazardous characteristics: ignitability, corrosivity, reactivity, or extraction procedure (EP) toxicity. Both radiological and chemical toxicity must be considered in its management and disposal.

Nuclear Regulatory Commission (NRC): Since January 19, 1975, the U.S. Nuclear Regulatory Commission has been the federal agency responsible for the licensing and regulation of commercial nuclear activity. The Commission also assists the U.S. Department of Transportation in regulating the transportation of radioactive materials and regulates the packaging of these materials for shipment.

Oils (contaminated): Lubricating or machine oil that becomes contaminated with radioactive materials.

Organic liquid: Carbon-based compounds such as alcohols, aldehydes, ketones, and organic acids. Organic liquid includes liquid scintillation media containing chemicals such as benzene, xylene, or toluene, and degreasing solvents such as carbon tetrachloride and freon.

Radioactive waste: Unwanted radioactive materials obtained from the processing or handling of radioactive materials.

Scintillation vial: A small plastic or glass vial used to contain scintillation fluid.

Stabilization: The structural support provided by the low-level radioactive waste form or the disposal module, which renders radioactive waste structurally stable to physical, chemical, or biological degradation.

Toxicity characteristic leaching procedure (TCLP): Total waste analysis or waste extract test to determine its leaching capability.

Transuranic: An element with an atomic number greater than 92, the atomic number of uranium. All known transuranic elements are radioactive and are produced artificially.

Treatment: Any method, technique, or process, including storage for radioactive decay, designed to change the physical, chemical, or biological characteristics or composition of any waste in order to render the waste safer for transport, storage, or disposal, amenable to recovery, convertible to another usable material, or reduced in volume.

ACRONYMS AND ABBREVIATIONS

AEA	Atomic Energy Act
BDAT	best demonstrated available technology
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DEACT	deactivation
DHS	Department of Health Services
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DSSI	Diversified Scientific Services, Inc.
EPA	U.S. Environmental Protection Agency
FFCA	Federal Facilities Compliance Act
GTCC	Greater-than-Class C
HPLC	high-pressure liquid chromatography
HSWA	Hazardous and Solid Waste Amendments
HWIR	Hazardous Waste Identification Rule
LDR	land disposal restriction
LLRWPAA	Low-Level Radioactive Waste Policy Amendments Act
LLW	low-level radioactive waste
LSC	liquid scintillation counting
MWIP	Mixed Waste Integrated Program
NARM	naturally occurring and accelerator-produced radioactive material
NORM	naturally occurring radioactive materials
NRC	U.S. Nuclear Regulatory Commission
PCB	polychlorinated biphenyl
PFF	Perma-Fix of Florida, Inc.
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
SEG	Scientific Ecology Group, Inc.
TC	toxic characteristic
TCLP	Toxicity Characteristic Leaching Procedure
TOC	total organic carbon
TSD	treatment, storage, and disposal

Mixed Waste Management Options: 1995 Update

1. INTRODUCTION

1.1 Background

As defined by the Federal Facility Compliance Act (FFCA) amendments to the Resource Conservation and Recovery Act (RCRA, 42 USC 6901 et seq.), mixed wastes are wastes that contain both hazardous waste and source, special nuclear, or byproduct material subject to the Atomic Energy Act (AEA) of 1954 (42 USC 2011 et seq.). In accordance with U.S. Environmental Protection Agency (EPA)-published guidance (51 FR 24504, July 3, 1986), low-level radioactive wastes containing radioactive materials regulated under AEA and hazardous wastes regulated under RCRA are subject to both sets of statutory requirements. In particular, commercial low-level "mixed wastes" must meet treatment standards specified in 40 CFR 268 and waste form requirements detailed in 10 CFR 61 prior to disposal in a land-based unit meeting both RCRA and AEA standards.

The Low-Level Radioactive Waste Policy Amendments Act (LLRWPAA), enacted January 15, 1986, assigned to states or compact regions responsibility for the disposal of low-level radioactive wastes generated within that state or compact region after December 31, 1992. An interim milestone, January 1, 1990, required compact regions and noncompact member states to submit either complete license applications or written certifications. The governor's certification would commit the state to provide for the management of the low-level radioactive waste generated within its borders after December 31, 1992.

The governors' certifications included survey information detailing the amounts and types of mixed waste generated by the states. It was difficult to project estimated volumes of mixed waste that would require disposal because necessary treatment facilities were not yet constructed or permitted. However, the surveys indicated that the actual amount of waste that will require disposal in a facility meeting AEA and RCRA requirements would be considerably less than the amount of mixed waste generated.

This concept was confirmed in 1992 when EPA and the U.S. Nuclear Regulatory Commission (NRC) sponsored a comprehensive assessment of the Nation's mixed waste. This assessment, titled *National Profile on Commercially Generated Low-Level Radioactive Mixed Waste* (National Profile), compiled information on the volumes, characteristics, and treatability of commercially generated mixed waste by clearly defined facility categories. The National Profile indicated that 139,441 cubic feet of waste was generated, but only 11,954 cubic feet was untreatable (Klein et al., 1992). Estimates of very small volumes of mixed waste have led to a wide range of disposal cost estimates. They range from only small incremental increases for mixed waste compared with non-RCRA regulated waste disposed of at the same facility to as much as $15,000 per cubic foot if a separately established mixed waste disposal facility were developed independently for a small volume of mixed waste.

The regulatory burden, public opposition to new disposal sites, and relatively high cost of constructing proper disposal facilities make alternative strategies for management of mixed waste potentially more attractive than land disposal. This preference was highlighted in a letter dated April 15, 1990, from Ron Gaynor, Vice President, U.S. Ecology, to Don Womeldorf, Chief,

Environmental Management Branch, California Department of Health Services (DHS). In his letter, Mr. Gaynor stated:

> Rather than developing an expensive, eventually unnecessary mixed waste disposal facility, DHS can, within existing regulations and regulatory authority, determine that all mixed waste must be treated to the extent that it is no longer regulated as a hazardous waste.

In reaction to Mr. Gaynor's letter, California and several other states requested that the U.S. Department of Energy (DOE) explore the feasibility of generators being able to eventually stop the production of mixed waste requiring land disposal at jointly regulated facilities. Thus, the original *Mixed Waste Management Options* (DOE/LLW-134) report was issued in December 1991 and answered the question: "Can mixed waste be managed out of existence?" The answer to that question was that most, but not all, mixed waste can be managed theoretically out of existence.

1.2 Purpose

The primary objective of this study is to provide a better understanding of what mixed waste streams can and cannot be managed out of existence using the treatment technologies currently available and those soon to become available.

A second objective is to offer a current picture of the volume of mixed waste that cannot be treated out of existence and still needs to be disposed under the joint AEA/RCRA regulations. This study uses data from the National Profile that was not available when the original *Mixed Waste Management Options* report was issued. Additionally, several treatments are expected to become available within the next few years that were not included in the National Profile's estimates of treatability.

1.3 Methodology

Project objectives were accomplished in two phases. Under Phase I, existing and representative data about mixed waste were evaluated based on the subject areas outlined above. Specific treatment methods for each type of waste were identified. In Phase II, Federal regulations for delisting, no migration petitions, treatability variances, and Determinations of Equivalent Treatment were analyzed for applicability to the storage and disposal of mixed waste. The feasibility of applying these variances to the mixed waste streams analyzed in Phase I was also evaluated.

1.3.1 Phase I: Technology Review

Under Phase I, the mixed waste streams identified in the National Profile were individually evaluated and sorted according to their feasibility of being regulated solely under AEA or RCRA requirements. This task was accomplished in the following steps:

1. Grouping the data contained in the National Profile by:

    a. Sorting the mixed waste streams into characteristic waste categories (e.g., ignitable, corrosive, reactive, metals, characteristic organics)

b. Sorting the mixed waste streams into listed waste code categories (e.g., F001 and F002 wastes, F003 wastes, F005 wastes, and U- and P-listed wastes)

c. Sorting the mixed waste streams into other categories based on similarities of generation [e.g., liquid scintillation counting (LSC) wastes, other organics, miscellaneous wastes, oils, biological wastes, paint wastes]

d. Further sorting each of the waste categories by physical form.

2. Tabulating the volume and activity of each of the waste categories as reported in the National Profile. If information on a particular waste stream was missing, it was assumed that the missing information was not critical to the management of the waste.

3. Evaluating which of the commercial treatments that are currently available, and those likely to become available in the near future, could be employed for each waste stream. Each waste stream was placed in one of four categories:

   a. Wastes for which treatment currently existed

   b. Wastes for which treatment was likely to become available in the near future

   c. Wastes for which no treatment was known

   d. Wastes streams that were not sufficiently described in the National Profile to make a determination regarding the availability of treatment.

4. For those wastes having currently available treatment, tabulating estimates of post-treatment volumes requiring land disposal under joint regulation as mixed waste. Simplifying assumptions regarding volume reduction factors were used to make these estimates.

5. For those wastes having no known treatment, tabulating pre-treatment volumes of waste. Because of the land disposal restrictions, these wastes cannot be land-disposed without further treatment or regulatory justification. Therefore, estimates of wastes having no known treatment may not necessarily represent estimates of wastes requiring jointly regulated land disposal.

The evaluation generally followed the steps outlined in Figure 1-1.

1.3.2 Phase II: Review of Regulatory Alternatives to Treatment Requirements

Regulatory alternatives include delisting the waste under 40 CFR 261, and alleviating treatment requirements through preparation and submittal of no migration, treatability, and Determination of Equivalent Treatment variance petitions under 40 CFR 268. Approval of the delisting petition would allow disposal of "listed" mixed waste without regard to any RCRA Subtitle C requirements. Approval of a no migration variance under 40 CFR 268 would allow storage or disposal of mixed wastes without meeting EPA's prescribed treatment standards.

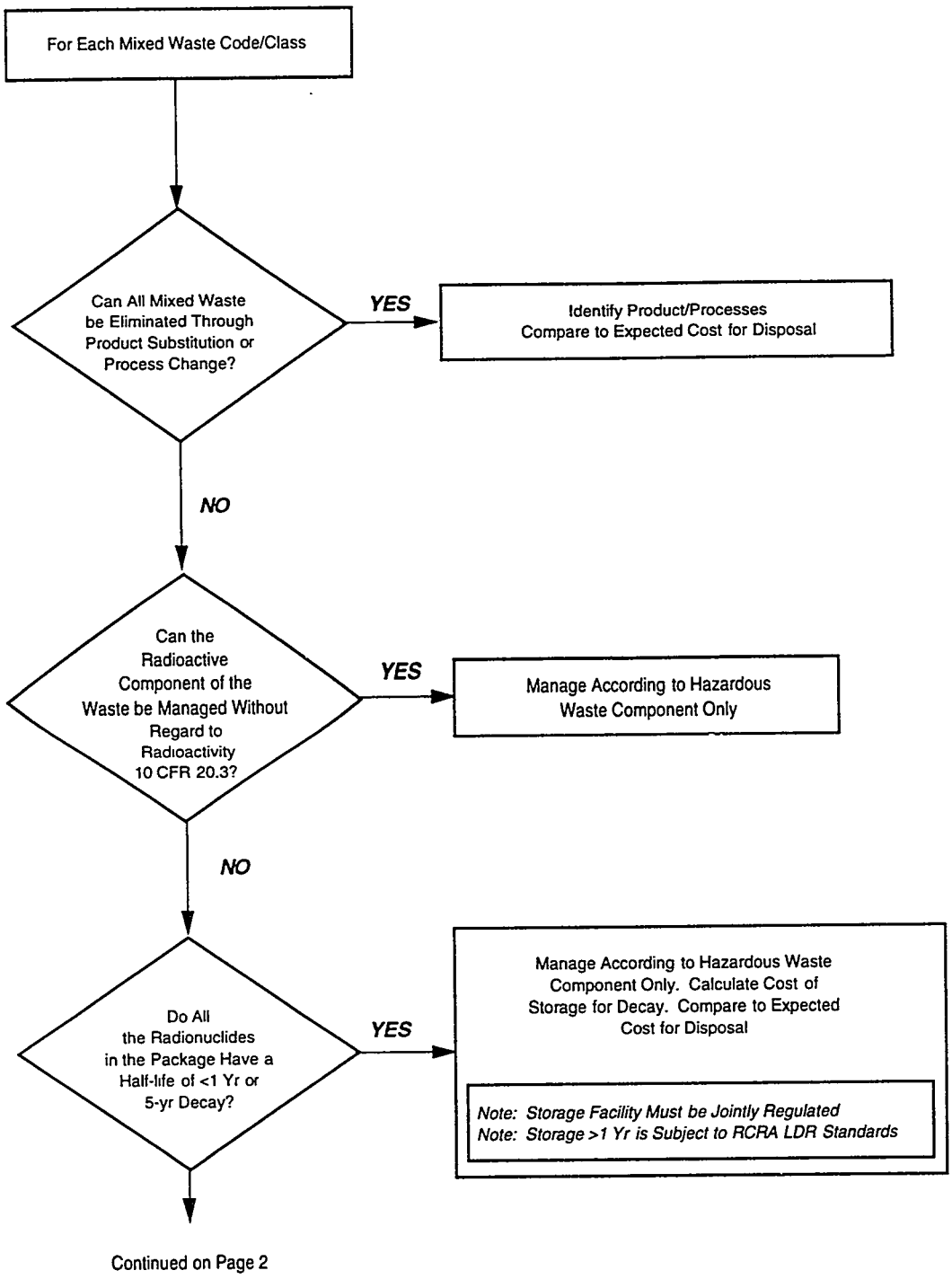

Figure 1-1. Mixed waste management schematic.

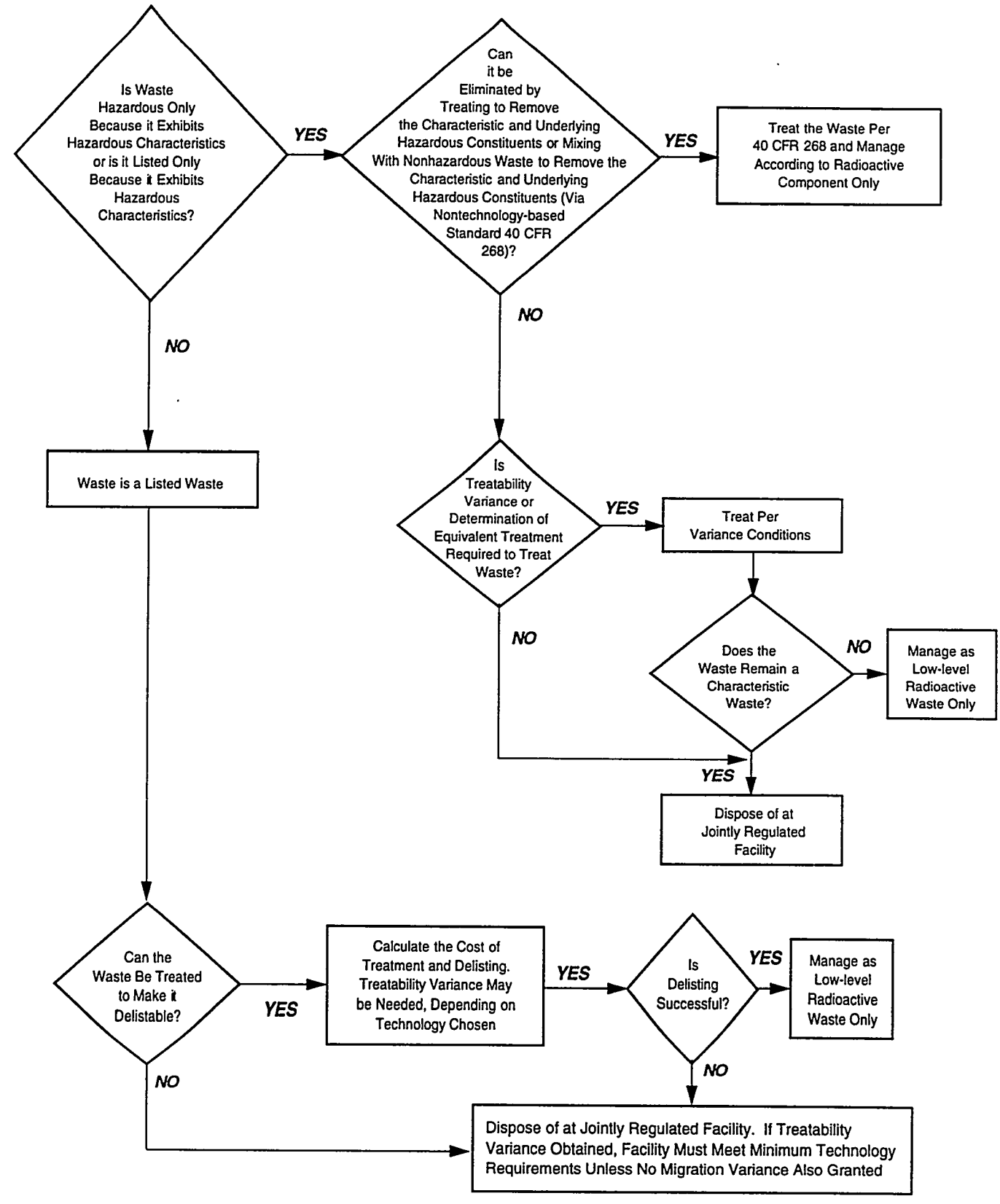

Figure 1-1 (continued). Mixed waste management schematic.

Receipt of a treatability variance under 40 CFR 268 could allow alternative or customized methods of treatment to those prescribed in the regulations. Hazardous waste statutes and regulations in states designated as host states for low-level radioactive waste disposal facilities were also compared with 40 CFR 268 standards for no migration petitions, delisting petitions, and treatability variances.

For listed wastes, the following additional topics were evaluated:

- Extraordinary treatment that may be necessary before delisting the wastes
- Tests, demonstrations, and evaluations necessary to delist the waste
- Assessment of costs and historical success involved with treatment and delisting of wastes.

Historical information regarding the success of the petitions was obtained from EPA officials in Washington, D.C., responsible for petition review. Information was also compiled and evaluated regarding waste elimination, including substitution of nonhazardous raw materials and avoidance of generation via process changes, recycling, and segregation of waste.

1.4 NARM Waste

The analyses outlined above did not include naturally occurring and accelerator-produced wastes (NARM). NARM wastes are not low-level radioactive wastes subject to NRC licensing since they are not regulated under the AEA of 1954, as amended. However, most states have regulatory programs controlling their use, possession, and disposal because their indiscriminate disposal is a threat to human health and to the environment. Large volumes of NARM wastes containing naturally occurring radioactive materials (NORM) are routinely generated as a result of mining, ore processing, and petrochemical exploration and refining activities. The Conference of Radiation Control Program Directors has developed draft regulations governing the use, possession, transfer, and disposal of NORM; however, these regulations are not mandatory aspects of a state radiation control program. Similarly, the Federal Government has been slow to uniformly regulate NORM. Disposal of NORM wastes resulting from beneficiating (i.e., processing) phosphate rock and uranium ores was considered early in the development of RCRA regulations (45 FR 33087, May 19, 1980). Since Congress was expected to remove this type of NORM from RCRA jurisdiction by virtue of the Uranium Mill Tailings Radiation Control Act, EPA undertook no further consideration of NORM under RCRA.

NORM wastes tend to represent large volumes of relatively low-activity wastes, usually having elevated concentrations of radium, uranium, and thorium, along with their decay products. Radiation control measures are aimed at controlling radon emanations from these NORM wastes. External radiation exposures are a secondary concern. Because of their similarity to uranium mill tailings, NORM wastes are often controlled by means similar to those applied to uranium milling operations. Tailings are required to be placed in lined areas, with sufficient cover to control radioactive emissions to levels that would not represent a hazard to neighboring residents. Concentrations of radium in surface and near-surface soils are usually controlled to specified levels. Groundwater monitoring programs emulate those required of RCRA-regulated facilities.

Alternatively, NORM wastes may be disposed of by transfer to a facility licensed by a state to receive such wastes. One such facility, Envirocare of Utah,[1] is licensed and permitted to accept relatively low concentrations of NORM and other low-concentration AEA-regulated mixed wastes for land disposal. To be eligible for disposal, a waste cannot exceed 2,000 picocuries per gram (pCi/g) of total NORM activity. Similarly, wastes containing up to 360 pCi/g of ^{60}Co and 560 pCi/g of ^{137}Cs[2] may be received under this Agreement State license. Eligible waste for this facility is typically contaminated soil and debris. Because NORM is not regulated under either the AEA or RCRA, provision for adequate disposal capacity of this type of radioactive waste is not mandated under the LLRWPAA or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Consequently, NORM wastes are not featured in this study.

1.5 Organization of This Report

This report updates the original report, *Mixed Waste Management Options* (DOE/LLW-134). It is divided into two parts: a relatively short narrative and a more voluminous part containing three appendices. The first part begins with an introductory section explaining the history and scope of the report. Section 2 provides a brief description of the regulatory requirements for mixed waste management. Section 3 contains an overview of generated and stored mixed waste. Section 4 describes the various options available for managing mixed waste, including options that avoid generating mixed waste altogether. Section 5 develops a management strategy for each of the mixed waste streams and identifies each of those individual wastes that are likely not treatable. Section 6 summarizes the findings of the first part of the report, and Section 7 provides references.

The second and largest part of this report consists of three appendices. Appendix A and Appendix B list the individual mixed wastes that were generated and stored as of December 31, 1990, respectively. Appendix C contains copies of waste acceptance criteria for commercially available treatment facilities.

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1. Mention of a commercial product or firm does not constitute endorsement of that product or firm by the Department of Energy or any of its contracting firms.

2. Personal communication with Susan Rice, Envirocare of Utah, May 8, 1991.

2. OVERVIEW OF MIXED WASTE REGULATORY REQUIREMENTS

An understanding of the regulatory framework of AEA and RCRA is required for generators to evaluate their mixed waste disposal options. This section provides a description of the regulatory programs governing radioactive and hazardous waste management.

2.1 Radioactive Waste Management

The NRC is responsible for licensing and regulating the receipt, use, transfer, possession, and disposal of byproduct, source, and special nuclear material, and for conducting research in support of the licensing and regulatory process. The NRC has four regional offices: King of Prussia, Pennsylvania; Atlanta, Georgia; Lisle, Illinois; and Arlington, Texas. Twenty-nine states are allowed by agreement with the NRC to regulate most commercial radioactive material practices. The 29 "Agreement States" are as follows:

> Alabama, Arizona, Arkansas, California, Colorado, Florida, Georgia, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Mississippi, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Oregon, Rhode Island, South Carolina, Tennessee, Texas, Utah, and Washington.

Two-thirds of all commercial license applications are received and processed through the Agreement States. The remaining one-third are received and processed through the NRC regional offices.[3]

The NRC maintains sole authority for regulating production and utilization facilities, such as commercial nuclear power plants, and several other practices reserved for sole NRC jurisdiction (Office of Technology Assessment, 1989). The Agreement States have the authority to regulate most other commercial practices involving radioactive materials, including waste management practices.

The LLRWPAA has defined low-level radioactive waste (LLW) as waste containing source, special nuclear, or byproduct material that is not classified as high-level radioactive waste, spent nuclear fuel, or byproduct material as defined in Section 11e(2) of the AEA. An NRC or Agreement State license is required to receive, possess, and dispose of wastes containing source, byproduct, or special nuclear material. Licensing requirements for manufacturing, producing, transferring, receiving, acquiring, owning, possessing, or using byproduct, source, and special nuclear material are discussed in 10 CFR Parts 30 through 33, 40, and 70. These regulations discuss the following:

- Rules of General Applicability to Domestic Licensing of Byproduct Material (10 CFR 30)
- General Domestic Licenses for Byproduct Material (10 CFR 31)

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3. Personal communication with Michael LaMaster, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission Headquarters, Rockville, Maryland, December 7, 1994.

- Specific Domestic Licenses to Manufacture or Transfer Certain Items Containing Byproduct Material (10 CFR 32)
- Specific Domestic Licenses of Broad Scope for Byproduct Material (10 CFR 33)
- Domestic Licensing of Source Material (10 CFR 40)
- Domestic Licensing of Special Nuclear Material (10 CFR 70).

Regulations governing land disposal of LLW are contained in 10 CFR 61; health protection standards are given in 10 CFR 20; low-level radioactive waste manifesting and reporting requirements are found in 10 CFR 20, Appendix F; and transportation requirements are given in 10 CFR 71.

Classification of Low-Level Radioactive Waste—Classification of LLW is described in 10 CFR 61.55 and involves consideration of both long-lived radionuclides and short-lived radionuclides. Classification of the waste is determined according to allowable concentrations of radionuclides as specified in 10 CFR 61.55.

Three classifications of waste are established in 10 CFR 61: Class A, B, and C. Class A waste is usually segregated from the other waste classes and meets the minimum waste form criteria. Class B waste must meet more rigorous requirements for waste form to ensure structural stability after disposal. Class C waste must not only meet the more rigorous waste form requirements but also must be disposed of in a manner that protects against inadvertent intrusion. Those low-level radioactive wastes that have concentrations greater-than-Class C (GTCC) limits are not generally suitable for near-surface disposal. Disposal of GTCC wastes is a responsibility of the Federal government.

Waste Form Requirements—The following waste characteristics are the minimum requirements under 10 CFR 61.56:

- Waste must not be packaged in cardboard or fiberboard boxes
- Liquid wastes must be solidified or packaged in absorbent material that absorbs twice the volume of the liquid
- Solid waste shall not contain liquid in quantities greater than 1% volume
- Waste must not be capable of detonation or explosion
- Waste must not contain or be capable of generating toxic gases, vapors, or fumes harmful to workers
- Waste must not be pyrophoric
- Gaseous waste must be packaged at a pressure not exceeding 1.5 atmospheres at 20°C
- Waste containing hazardous, biological, pathogenic, or infectious material must be treated to reduce hazards.

Additionally, Class B and Class C waste must meet structural stability requirements. A structurally stable waste is one that will maintain its physical dimensions and identity for 300 years under the expected disposal conditions (e.g., compaction, overburden, moisture). Structural stability can be provided by the waste form itself, through processing such as solidification, or by placing the waste in a stable container or structure. Void spaces within or surrounding the waste must also be reduced to the maximum extent practicable.

Generator and Transportation Requirements—Generators of LLW must meet the requirements in 10 CFR 71 for packaging, preparation for shipment, and transportation of licensed material. Packaging and transport of licensed material are also subject to the requirements set forth in 10 CFR Parts 20, 21, 30, 40, 70, and 73 and to the regulations of the U.S. Department of Transportation (DOT). The transportation regulations of 10 CFR 71 apply to transport of material outside the confines of the licensee's "authorized place of use." The information required in a shipping manifest for radioactive waste is specified in 10 CFR 20 Appendix F and 49 CFR 173.

Licensing of Low-Level Radioactive Waste Disposal Facilities—NRC regulations governing the disposal of mixed waste are contained in 10 CFR 61 and address the following:

- Performance objectives for the operation of commercial LLW disposal facilities
- Technical requirements for the siting, design, operation, closure, and post-closure activities of LLW disposal facilities
- Technical requirements for waste stability
- Criteria for waste acceptance
- Criteria for the classification of LLW
- Administrative and procedural requirements for licensing disposal facilities
- Administrative requirements for closure, institutional control, and long-term care
- Provisions for adequate financial assurance.

Under 10 CFR 61, an application for a license must contain general, technical, institutional, financial, security, and other information.

2.2 Hazardous Waste Management

A notice issued July 3, 1986, (51 FR 24504), states that EPA and its authorized states will regulate the hazardous component of a mixed waste management stream through their RCRA programs. This notice was issued to clarify EPA's interpretation of RCRA Section 1004(27), which excludes "source, special nuclear, and byproduct material" from regulation under RCRA. EPA interpreted this exclusion to be specific only to the radioactive component of mixed waste. The definition of mixed waste was recently added to RCRA by the FFCA of 1992. Mixed wastes are a subset of hazardous wastes, and as such, are subject to the land disposal restrictions in 40 CFR 268.

This section presents the basic framework of the RCRA program and illustrates how EPA intends to apply these standards at mixed waste management facilities.

EPA regulations governing the implementation of the RCRA program are given in 40 CFR Parts 124, 260 through 266, 268, and 270. These regulations provide the following:

- Procedures for Decision Making (40 CFR 124)
- Hazardous Waste Management System: General (40 CFR 260)
- Identification and Listing of Hazardous Waste (40 CFR 261)
- Standards Applicable to Generators of Hazardous Wastes (40 CFR 262)
- Standards Applicable to Transporters of Hazardous Waste (40 CFR 263)
- Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 264)
- Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 265)
- Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (40 CFR 266)
- Land Disposal Restrictions (40 CFR 268)
- EPA-Administered Permit Programs: The Hazardous Waste Permit Program (40 CFR 270).

EPA has also published standards for Federal authorizations of state programs (40 CFR 271).

Identification of Hazardous Waste—Regulations given in 40 CFR 260 and 261 provide guidance to the regulated community and authorized state representatives on the definitions of solid and hazardous waste. The regulatory definition of hazardous waste is derived from Congress' definition in RCRA Section 1004(5), which states that hazardous waste:

- Causes, or significantly contributes to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness
- Poses a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed.

Under RCRA, hazardous waste is a subset of solid waste [RCRA Section 1004(27)]. In RCRA Section 3001(a), Congress directs EPA to develop and promulgate criteria to identify characteristics of hazardous waste and to list wastes to be regulated. In developing these criteria, EPA had to consider the toxicity, persistence, biodegradability, and potential for bioaccumulation of waste material.

EPA developed and published these criteria in 40 CFR 261, Subpart C (characteristic wastes) and Subpart D (listed wastes) (45 FR 33063, May 19, 1980). Subpart C provides the basis for determining if wastes are corrosive, ignitable, reactive, or toxic. The toxic characteristic (TC) under Subpart C is actually determined through application of a leach test, which models whether leachate from disposed waste would contain specified components above levels considered hazardous. Subpart D lists over 450 wastes from various specific and nonspecific sources. EPA also considers mixtures of listed hazardous waste or characteristic hazardous waste, which still exhibit hazardous characteristics, to be hazardous waste. Residue from the treatment of listed hazardous waste was also considered hazardous waste.

Hazardous Waste Generator and Transporter Requirements—Generators of hazardous waste are required by 40 CFR 262 to obtain an EPA identification number and to "manifest" all offsite shipments using an EPA-specified reporting form [EPA Form 8700-22 (Rev. 9-86)] and hazardous waste codes. Transporters are required to comply with manifest and recordkeeping specifications of 40 CFR 263. These regulations incorporate and are consistent with DOT regulations in 49 CFR Subchapter C. Transportation regulations of 40 CFR 263 do not need to be met for onsite shipments of hazardous wastes. Generators storing wastes for longer than 90 days must obtain a RCRA permit.

Technical Standards for Permitting of Hazardous Waste Facilities—An owner or operator of a treatment, storage, and disposal (TSD) facility regulated by EPA is required to obtain a permit to handle hazardous waste under 40 CFR 264. General facility standards, requirements for preparedness and prevention, contingency planning and emergency response, manifest system and reporting provisions, corrective action compliance, closure and post-closure care, and financial assurance provisions are sections of 40 CFR 264 that apply to all TSD operators.

Facilities in authorized states would be subject to state requirements, which can be more stringent and of greater scope than their Federal counterparts. Existing TSD operators who qualified for interim status (under the provisions of 40 CFR 270.70) are subject to 40 CFR 265 regulations once their Part A permit applications were submitted. The interim status regulations match the format of the 40 CFR 264 regulations except for minor modifications. Once permitted, owner/operators must comply with the terms and conditions of the final permit, plus any newly effective Hazardous and Solid Waste Amendments (HSWA) requirements. Final permit conditions are based on 40 CFR 264 requirements.

While preliminary designs for mixed waste disposal facilities are typically engineered structures, EPA can be expected to evaluate such a structure as a landfill or as a miscellaneous unit drawing heavily on landfill requirements. Currently, there is only one facility, Envirocare of Utah, Inc., that provides disposal capacity for certain types of commercially generated mixed waste. Envirocare accepts mainly low activity and high volume mixed wastes.

Regulations under 40 CFR 266 are for owners and operators of specific types of facilities such as energy recovery or precious metals recovery.

The Land Disposal Restrictions—The land disposal restrictions (LDRs) establish treatment standards prescribing how hazardous wastes must be treated before they can be disposed in or on the land. A treatment standard may specify a concentration threshold that can be attained by one or more technologies or it may require the waste be treated using one particular technology. Treatment standards are based upon performance characteristics of the

best demonstrated available technology (BDAT) for specific waste components. Consequently, two different treatment concentrations and BDATs may be listed depending on the nature of the waste (wastewater or nonwastewater).

Historically, EPA issued treatment standards according to waste codes. Under this approach, some waste codes carried different treatment standards for the same constituent. To address these inconsistencies, on September 19, 1994, (59 FR 47982), EPA announced the concept of "universal treatment standards." Under this scheme, the same standard applies to a constituent regardless of the source of the waste. Thus, many treatment standards have been replaced with a universal treatment standard.

Under the concept of universal treatment standards, the underlying hazardous constituents for certain toxicity characteristic organic wastes (D018 to D043) must also be treated to the specified universal treatment standards for that constituent. EPA has, however, established a 2-year National capacity variance under which radioactive mixed wastes containing newly listed hazardous wastes (K141 to K145 and K147 to K151) or these toxicity characteristic wastes (including soil and debris) are not subject to the applicable treatment standards until September 19, 1996.

As a consequence of the LDR rules, generators of hazardous waste are responsible for ensuring adequate treatment of manifested wastes before shipment to a land disposal facility. Under penalty of enforcement action, owner/operators of disposal facilities must include testing frequencies and protocols to verify compliance with the LDRs. Owner/operators may not accept wastes that exceed the LDRs unless they have onsite capabilities for treating the wastes to meet required standards or the wastes have been exempted under 40 CFR 268.5 (extension), 268.6 (no migration variance), or 268.44 (treatability variance).

EPA has issued LDR standards for spent solvents and dioxins, "California list" wastes, underground injection activities, first-third wastes, second-third wastes, third-third wastes, and debris contaminated with hazardous waste constituents. Although mixed wastes are subject to LDRs, EPA recognized that there is little or no commercial capacity available to accept mixed wastes. To address this problem, EPA issued a policy announcing that the agency will not enforce the storage prohibition on mixed wastes for generators who produce less than 1,000 cubic feet per year of mixed wastes (51 FR 40572, August 29, 1991). This policy, however, is predicated on facilities managing their mixed waste in an environmentally responsible manner. According to EPA, the nonenforcement policy should cover most of the regulated community, as EPA estimates that there are typically only two 55-gallon drums or less of mixed waste generated per year per facility (59 FR 18813, April 20, 1994). The nonenforcement policy will remain in force until April 20, 1996, subject to further extensions (59 FR 18815, April 20, 1994).

Permitting of Hazardous Waste Management Facilities—Regulations given in 40 CFR 270 provide generators and state and Federal reviewers the basic requirements for developing, submitting, and reviewing a permit application. A RCRA permit application consists of two parts, Part A (40 CFR 270.13) and Part B (40 CFR 270.14, and applicable sections of 270.15 through 270.29). Part A consists of Forms 1 and 3 of the Consolidated Permit Application Forms. Part A provides information on the general facility, the owner/operator, and types and quantities of hazardous wastes handled at the facility.

A Part B permit application is required by EPA or an authorized state to determine compliance with the 40 CFR 264 technical standards. Programs for executing extensive

groundwater monitoring requirements, recordkeeping and reporting, and inspection requirements must be outlined in the Part B application. A closure and post-closure care plan, a preparedness and prevention plan, a contingency plan, and an exposure information report should also be included in the submittal. A waste analysis plan is also an important part of the Part B application for a mixed waste disposal facility, since detailed analysis of waste can increase radiation exposures. Certain technical data such as design drawings and specifications, and engineering studies must be certified by a registered professional engineer. Additional information on permitting and licensing requirements can be found in DOE's *Mixed Waste Disposal Facility Implementation Plan* (U.S. Department of Energy, 1990).

Federal Facilities Compliance Act—The FFCA was signed into law on October 6, 1992, (P.L. 102-386). Under the FFCA, the DOE is immune from RCRA enforcement actions for violating the storage prohibition until October 6, 1995, as long as the wastes are managed in compliance with all other applicable requirements and an existing permit, agreement, or administrative/judicial order does not apply to the waste. Indefinite storage may be allowed if DOE prepares inventories of mixed wastes being stored at each facility and submits plans for developing mixed waste treatment capacity and technology. The mixed waste inventories were summarized in the *Interim National Inventory of DOE Mixed Wastes and Treatment Technologies and Capacities* issued by the DOE on April 21, 1993. If not in compliance with an approved plan, DOE facilities could face fines and penalties from the state or EPA after October 1995.

3. COMMERCIALLY GENERATED MIXED WASTE STREAMS

Under Phase 1 of the project, existing and representative data on mixed waste were evaluated to determine the type of waste requiring treatment. Outlined below is a discussion of the waste characterization methodology employed, treatment requirements for mixed waste, and descriptions of the categories of mixed waste that resulted from the evaluation.

3.1 Waste Characterization

Since mixed waste is subject to treatment requirements originating under the AEA and RCRA, it is necessary to characterize both the radioactive and hazardous components of the mixed waste.

As discussed in Section 1, the most recent and comprehensive estimate of the Nation's mixed waste storage and generation patterns was conducted jointly by the NRC and the EPA and published in a document herein called the National Profile (Klein et al., 1992). For development of the information, the NRC and EPA sent a questionnaire to representative and randomly selected licensees of either the NRC or an Agreement State who were likely to generate mixed waste. Responses were received from 1,016 generators who completed the mail-in survey form and returned it for data entry and processing. Consequently, the data in the National Profile rely heavily on the generators' abilities to both recognize the generation of mixed waste and to properly characterize that waste. It is important to note that the National Profile did not specifically attempt to address cleanup wastes from remedial action activities. If this type of waste was identified by a generator, the information was included as part of the results of the National Profile.

The National Profile applied a statistically derived weighting factor to reported volumes to approximate national conditions. The National Profile was designed to accurately describe the Nation's commercial mixed waste within a factor of 2 (with 95% confidence limits). This same factor of 2 also applies to mixed waste generated within the various categories of generator, i.e., nuclear utilities, medical, academic, industrial, and governmental facilities. Because of the limited number of generators surveyed in each state and compact region, estimates of mixed waste cannot be reliably extracted with the same confidence for individual states or compact regions.

This report uses data obtained from the National Profile to reevaluate and assess whether the mixed waste has an available treatment option. To perform this evaluation, data from the National Profile were grouped according to the description of the waste provided by the generators. Since collection of that data, the hazardous waste regulations have been revised to include organic wastes as characteristic wastes, establish treatment standards for newly identified wastes and wastewaters, and establish universal treatment standards for underlying hazardous constituents. These additional standards confound prediction of mixed waste treatment, since information on characteristic organics and underlying hazards in the wastes was not collected during the original survey.

For this analysis, the following assumptions are made:

- The data in the survey are correct; the waste is correctly characterized by the generator.

- If a waste is identified as being aqueous, it is assumed to be mostly water. If the waste is identified as a bulk liquid, it is assumed to be mostly composed of the identified components.

- If there is an ambiguity as to waste classification, it is assumed to be the more-difficult-to-treat waste option.

- If there was no activity or volume reported, it is assumed that the activity or volume would not be a discriminator in the management of the waste.

3.2 Treatment Requirements

Treatment requirements for the radioactive component of the waste depend on a knowledge of the radionuclide, its concentration in the waste, and the physical form of the waste. The concentration of the radionuclides determines the class of the waste (Class A, B, or C), whereas the physical form of the waste determines any special handling or packaging requirements.

Treatment requirements for RCRA-regulated waste depend on EPA-designated waste codes and whether the waste is a wastewater or nonwastewater. Classification of hazardous waste goes beyond merely identifying the chemicals that were used to generate the waste; it also involves a knowledge of the industry or process generating the waste, as well as the physical form of the waste. Review and analysis of past surveys demonstrated that identification of hazardous waste codes is difficult.

Once the waste is classified by waste code (hazardous component), physical form, and waste class (radioactive component), the mandated treatment for each waste can be identified in 40 CFR 268. The minimum waste form requirements for radioactive waste are specified in 10 CFR 61.56. Those requirements must be met, or exceeded, for all radioactive wastes. If the waste is classified as Class B or Class C, the waste must also meet the waste form stability requirements; that is, the waste must be capable of retaining its physical form for at least 300 years. Compliance with the stability requirements is optional for Class A waste under NRC requirements.

Determining the required treatment for the hazardous waste component is more complicated, as each waste code and waste form has a treatment technology or concentration specified in 40 CFR 268. Those treatments were established to substantially diminish the toxicity of the waste, yield a waste that was no longer characteristically hazardous, or yield a waste that was treated with the best demonstrated available technology. In establishing its treatment requirements for most low-level radioactive mixed wastes, EPA requires the same treatment standards as for nonradioactive hazardous waste. A distinction was made only for those mixed wastes clearly posing a large external radiation hazard (e.g., high-level radioactive waste), or unique treatment problems (e.g., contaminated lead solids and mercury). For the many other types of mixed waste generated, EPA stated that it lacked sufficient information to establish treatment standards for mixed waste that were different from those for nonradioactive hazardous waste. With knowledge of the waste code, whether the waste is a wastewater or a nonwastewater, and the concentration of the hazardous component in the waste (in some circumstances), the treatment required under 40 CFR 268 can be determined.

3.3 Waste Descriptions

Each waste reported in the National Profile was reviewed and classified by its hazardous waste category and physical form. Table 3-1 presents a tabulation of the mixed wastes that were generated in 1990 and the reported volume of each of the wastes. Table 3-2 presents a tabulation based on the activity reported for each of the wastes. Tables 3-3 and 3-4 provide similar tabulations for volume and activity of wastes that were reported as "in storage" on December 31, 1990. For several wastes, there was no volume or activity reported by the generator.

While there were weighting factors applied to the volume of the waste, there was no similar weighting factor applied to the activity. Consequently, activity of the waste may be under-reported.

Detailed tabulations of all individual waste streams generated in 1990 are located in Appendices A-1 through A-15. Wastes that were in storage on December 31, 1990, are listed in Appendices B-1 through B-16. The wastes outlined in the tables and appendices are grouped based on their chemical characteristics as described in the following subsections.

3.3.1 Ignitable Waste

Ignitable wastes were identified by generators as D001 wastes and not further identified as liquid scintillation fluids, vials, or cocktail. The majority of the ignitable wastes were in the form of a liquid or bulk liquid. Ignitable wastes have a flashpoint of less than 140°F. As listed in Appendices A-1 (generated waste) and B-1 (stored waste), waste streams having the characteristic of ignitability include formaldehyde, methanol, ethanol, petroleum distillate, tetrahydrofuran, acetonitrile, acetone, methyl ethyl ketone, isopropanol, coal tars, naphthalene, CIS-2-pentene, ignitable adhesives, and paint waste. This waste is generated by all facility types including academia, government, nuclear utilities, and industry.

3.3.2 Corrosive Waste

Corrosive wastes are defined as those aqueous wastes having a pH of less than or equal to 2 or greater than or equal to 12.5. Alternatively, a liquid waste that corrodes steel at a rate greater than 6.35 mm at specified test conditions is also a corrosive waste. Appendices A-2 (generated waste) and B-2 (stored waste) list all the wastes in the National Profile that were identified as having the sole characteristic of corrosivity. It should be noted that some of these wastes are solid materials. Because the definition of corrosivity in 40 CFR 261.22 pertains only to liquids, such materials should not be a characteristic waste. Nonetheless, the solid corrosive wastes were identified as being generated. It was assumed that commercial treatment was available for these wastes.

3.3.3 Biological Waste

The biological waste category was included in this study because the waste was identified in the National Profile as a mixed waste generated in 1990, as summarized in Appendix A-3. It is not readily apparent, from the descriptions of the waste and generating processes, why these wastes were included as mixed wastes. Consequently, biological wastes are assumed to be treatable by currently available means, and none require further management as a mixed waste under RCRA.

Table 3-1. Summary of waste volumes generated in 1990 by hazardous constituent group and physical form.

Waste	*Weighted Volume in cubic meters before treatment*						***Total Volume***	***Percent Volume***
	Aqueous	*Liquid, n.o.s.*	*Absorbed Liquid*	*Solid, n.o.s.*	*Trash*	*Unknown a/*		
Ignitable	0.43	66.95	0.40	0.49	0.42		68.69	1.96
Corrosive		36.98		42.10			79.08	2.26
Biological		1.40	0.25	3.56			5.21	0.15
Reactive		0.21		12.75	0.38		13.34	0.38
Characteristic Metals	18.09	2.07	1.61	234.05	3.09	24.67	258.91	7.41
Characteristic Organics		36.67	0.04	1.52			38.23	1.09
F001 & F002	9.45	37.82		52.45			99.72	2.85
F003	0.10	48.91	0.37		0.53		49.91	1.43
F005		129.42	1.40	7.99	5.33		144.14	4.12
P & U Listed	0.02	4.07	8.01	0.56	3.44		16.10	0.46
Oils	0.79	141.73	1.77			4.89	144.29	4.13
Other Organics		5.98		0.03		24.96	6.01	0.17
LSC	313.67	1,985.00	36.29	10.35		312.98	2,345.31	67.08
Multi-Code Waste	3.36	111.91	0.08	0.60	73.28	0.00	189.23	5.41
Miscellaneous			0.17	2.43	35.37	0.36	37.97	1.09
TOTAL VOLUME	345.91	2,609.12	50.39	368.88	121.84	367.86	3,496.14	
Percentage Volume	9.89	74.63	1.44	10.55	3.48			

a/ Volumes of hazardous constituents for which the physical forms are not known are shown in this table. However, these volumes have not been included in the total volume and percent volume calculations.
n.o.s. = not otherwise specified

Table 3-2. Summary of waste activity generated in 1990 by hazardous constituent group and physical form.

Waste	*Activity in mCi before treatment*						*Total Activity*	*Percent Activity*
	Aqueous	*Liquid, n.o.s.*	*Absorbed Liquid*	*Solid, n.o.s.*	*Trash*	*Unknown a/*		
Ignitable	1.00	1,513.02	0.20	0.06	0.01		1,514.29	0.59
Corrosive		105.07		60.50			165.57	0.06
Biological		50.00	0.00	176.44			226.44	0.09
Reactive		7.13		1.00	0.10		8.23	0.00
Characteristic Metals	1.56	6.02	52.39	88,842.90	2.81	0.00	88,905.68	34.47
Characteristic Organics		48,769.20	15.00	31.00			48,815.20	18.93
F001 & F002	25,000.00	169.24		118.42			25,287.66	9.80
F003	1,982.00	3,308.48	100.00		2.00		5,392.48	2.09
F005		47,709.09	10.81	0.00	3.88		47,723.78	18.50
P & U Listed	0.00	89.71	9.00	6,000.00	2.49		6,101.20	2.37
Oils	30.00	18.03	0.00			0.00	48.03	0.02
Other Organics		151.06		0.00		0.00	151.06	0.06
LSC	259.95	15,796.50	152.67	14.19		310.17	16,223.31	6.29
Multi-Code Waste	0.00	13,805.66	3,173.35	41.94	1.30	0.00	17,022.25	6.60
Miscellaneous			34.00	200.01	92.00	0.00	326.01	0.13
TOTAL ACTIVITY	27,274.51	131,498.21	3,547.42	95,486.46	104.59	310.17	257,911.19	
Percentage Activity	10.58	50.99	1.38	37.02	0.04			

a/ Volumes of hazardous constituents for which the physical forms are not known are shown in this table. However, these volumes have not been included in the total volume and percent volume calculations.
n.o.s. = not otherwise specified

Table 3-3. Summary of waste volumes in storage as of December 31, 1990 by hazardous constituent group and physical form.

	Weighted Volume in cubic meters before treatment							
Waste	*Aqueous*	*Liquid, n.o.s.*	*Absorbed Liquid*	*Solid, n.o.s.*	*Trash*	*Unknown a/*	***Total Volume***	***Percent Volume***
Ignitable	1.02	48.34	0.38	1.18			50.92	3.78
Corrosive	3.94	4.62	1.26	3.47			13.29	0.99
Biological							0.00	0.00
Reactive		0.21		73.50			73.71	5.48
Characteristic Metals	5.87	1.10	1.83	256.28	2.05		267.13	19.84
Characteristic Organics		1.87	0.10				1.97	0.15
F001 & F002	58.80	140.83		71.48		0.65	271.11	20.14
F003	0.29	6.21		1.74	1.10		9.34	0.69
F005		3.18	9.93	14.17	1.10		28.38	2.11
P & U Listed		3.17	0.07	1.67	3.42		8.33	0.62
Oils		92.70	0.47			3.08	93.17	6.92
Other Organics		0.44			0.18	1.20	0.62	0.05
LSC	92.52	245.97	5.66	5.95		1.69	350.10	26.01
Multi-Code Waste	0.02	84.54	1.73	2.17	3.59		92.05	6.84
Miscellaneous	21.40	22.33	17.07	8.12	7.53	1.40	76.45	5.68
Dioxin		0.04			2.79		2.83	0.21
Paint Waste		4.14		2.57			6.71	0.50
TOTAL VOLUME	183.86	659.69	38.50	442.30	21.76	8.02	1,346.11	
Percentage Volume	13.66	49.01	2.86	32.86	1.62			

a/ Volumes of hazardous constituents for which the physical forms are not known are shown in this table. However, these volumes have not been included in the total volume and percent volume calculations.
n.o.s. = not otherwise specified

Table 3-4. Summary of waste activity in storage as of December 31, 1990 by hazardous constituent group and physical form.

	Activity in mCi before treatment							
Waste	*Aqueous*	*Liquid, n.o.s.*	*Absorbed Liquid*	*Solid, n.o.s.*	*Trash*	*Unknown a/*	*Total Activity*	*Percent Activity*
Ignitable	1.73	112.37	0.41	0.04			114.55	0.03
Corrosive	16.11	17.09	60.00	0.00			93.20	0.02
Biological							0.00	0.00
Reactive		0.03		262.78			262.81	0.06
Characteristic Metals	4.10	1.14	2.00	87,560.95	0.22		87,568.41	20.07
Characteristic Organics		3,349.56	0.00				3,349.56	0.77
F001 & F002	1.05	735.30		223.71		0.00	960.06	0.22
F003	4,624.90	114.77		0.00	27.00		4,766.67	1.09
F005		16.00	50.40	0.00	0.00		66.40	0.02
P & U Listed		166.22	0.35	6,000.01	6.99		6,173.57	1.41
Oils		191.81	0.00			0.00	191.81	0.04
Other Organics		102.35			0.00	0.00	102.35	0.02
LSC	117.63	5,340.37	0.54	12.10		0.00	5,470.64	1.25
Multi-Code Waste	0.00	45,575.27	3,375.00	3.64	3.92		48,957.83	11.22
Miscellaneous	1.50	275,100.68	0.68	3,150.00	10.00	15.00	278,262.86	63.77
Dioxin		1.95			2.02		3.97	0.00
Paint Waste		0.03		0.12			0.15	0.00
TOTAL ACTIVITY	4,767.02	330,824.94	3,489.38	97,213.35	50.15	15.00	436,344.84	
Percentage Activity	1.09	75.82	0.80	22.28	0.01			

a/ Activity of hazardous constituents for which the physical forms are not known are shown in this table. However, these activities have not been included in the total activity and percent activity calculations.
n.o.s. = not otherwise specified

3.3.4 Reactive Waste

Reactive wastes (a) are normally unstable and readily undergo violent change without detonating, or (b) react violently with water, or (c) form potentially explosive mixtures with water, or (d) when mixed with water generate toxic gases, vapors, or fumes in sufficient quantity to be dangerous to human health or the environment, or (e) are cyanide or sulfide bearing wastes which under specified conditions are dangerous to human health or the environment, or (f) are capable of detonation or explosive reaction if subjected to a strong initiating source or heated under confinement, or (g) are readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure, or (h) are forbidden, Class A, or Class B explosives as defined by DOT regulations.

Reactive wastes identified in the National Profile are listed in Appendices A-4 (generated waste) and B-3 (stored waste). Academic institutions and industry generated all the reactive waste identified in the National Profile. It is the smallest category of mixed waste generation by volume and activity. However, reactive wastes have the largest percentage of waste streams that are untreatable. Since relatively small volumes of reactive waste exist, it is unreasonable to expect that commercial treatment facilities will develop customized treatments for these wastes at reasonable cost. Therefore, generators of reactive wastes may need to obtain treatment permits for custom management of these low-volume wastes that will satisfy the 40 CFR 268 requirements for DEACT (deactivation) to remove the reactive characteristic.

3.3.5 Characteristic Metals

Characteristic metal wastes are generated by academic institutions, industry, nuclear utilities, government, and medical facilities. This waste category is dominated by lead and lead shielding, mercury, cadmium, and chromium, as shown in Appendices A-5 (generated waste) and B-4 (stored waste).

3.3.6 Characteristic Organic Wastes

Typical characteristic organic wastes were identified as chloroform, methanol, and pesticides as listed in Appendices A-6 (generated waste) and B-5 (stored waste). Academic institutions, industry, and government were identified as generators of this type of waste. Some waste streams exhibiting both the characteristic of ignitability and toxicity were also identified as characteristic organic waste. Detailed descriptions of hazardous components were inconsistent in some instances with the EPA waste code identified for this waste. For example, waste codes D022 (chloroform) and D001 (ignitability) were assigned to a waste stream identified as "organic solvents." In these cases, the waste was classified according to the waste code.

3.3.7 F001 and F002 Wastes (Spent Halogenated Solvents)

F001 and F002 wastes have generally the same chemical constituents, although their solvent uses differ. They are listed wastes, and when managed as something other than a fuel substitute, their residues retain their listed hazardous waste designation. While a portion of these wastes is generated by industry, government, and academia, most of the F001 and F002 wastes are generated by nuclear utilities where they are used for general degreasing and cleaning of contaminated reactor components. In recent years, however, nuclear utilities have phased out their usage. F001 and F002 wastes are listed in Appendices A-7 (generated waste) and B-6 (stored waste).

3.3.8 F003 Wastes (Nonhalogenated Spent Solvents)

F003 wastes that were not identified as liquid scintillation cocktail wastes are listed in Appendices A-8 (generated waste) and B-7 (stored waste). Generators include industry, nuclear utilities, academic institutions, government, and medical facilities. F003 wastes are certain nonhalogenated solvents that are listed because they are ignitable. These solvents include xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol.

3.3.9 F005 Wastes (Nonhalogenated Spent Solvents)

F005 wastes that were not identified as LSC wastes are listed in Appendices A-9 (generated waste) and B-8 (stored waste). Generators include industry, nuclear utilities, government, and academic institutions. F005 wastes include the following nonhalogenated spent solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane.

3.3.10 P- and U-Listed Wastes

P- and U-listed wastes are unused commercial chemical products that can no longer be used for their intended purpose, are off-specification, are the sole active ingredient in a chemical formulation, or are chemical intermediaries. Characterization of P- and U-listed wastes requires in-depth knowledge of the processes generating the waste. Upon close scrutiny, it is likely that some of these identified as P- or U-listed wastes may actually be characteristic or unregulated wastes. As stated previously, the generators' designation of those wastes identified in Appendices A-10 (generated waste) and B-9 (stored waste) is assumed to be correct. Industry, academic institutions, nuclear utilities, and government are identified as generating P- and U-listed wastes. As with other listed wastes, if treatment is by some means other than fuel substitution, treatment residues from this waste must be managed as a P- or U-listed hazardous waste.

3.3.11 Oil Waste

States can regulate additional wastes as hazardous that the EPA does not regulate as hazardous waste. Many of these oil wastes are examples of these "state-only" hazardous wastes. Oils that are not recycled can be Federally regulated as well. Industry, nuclear utilities, government, and academia generate radioactively contaminated oils that are managed as hazardous waste. Nuclear utilities generate most of these wastes, as shown in Appendices A-11 (generated waste) and B-10 (stored waste).

3.3.12 Other Organic Waste

For many organic wastes, there was insufficient information to classify the waste as either a listed or a characteristic organic waste. Because of similar generating processes and waste description, an estimate of treatment availability was made. Those organic wastes having

incomplete waste code descriptions are listed in Appendices A-12 (generated waste) and B-11 (stored waste).[4]

3.3.13 Liquid Scintillation Cocktail (LSC) Waste

Liquid scintillation counting fluids is the largest grouping of mixed wastes. They are listed in Appendices A-13 (generated waste) and B-12 (stored waste). LSC wastes are generated by every generator group in numerous applications such as diagnostic testing, research, and radiation protection monitoring. LSC fluids typically contain toluene, xylene, and, occasionally, benzene or pseudocumene. The organic liquid is used for its solvent and energy transmitting properties to dissolve a small amount of chemical fluor and provide a uniform counting solution. When a radioactive disintegration occurs in the solution, the fluor absorbs a proportion of the energy, giving off light. The amount of light emitted is therefore proportional to the amount and energy of the radioactivity. LSC techniques are most often used to measure low-energy beta particles such as those emitted by ^{3}H and ^{14}C. LSC techniques can also be used for other radiation detection applications as well.

LSC fluid wastes can be disposed of without regard to the radioactive component of the waste if they contain only ^{3}H or ^{14}C with a total concentration of 0.05 microcurie per gram of scintillation liquid according to 10 CFR 20.2005. In those cases where radionuclides other than ^{3}H or ^{14}C are present in the fluid, this exemption may not apply. If the concentrations of allowable nuclides exceed 0.05 microcurie per gram, waste aggregation is usually employed to reduce the concentration below the exempt or allowable level. LSC wastes are usually designated by EPA waste codes F003 (xylene), F005 (benzene or toluene), or D001, ignitability (dioxane or pseudocumene).[5]

More recent advances in counting technology have resulted in the substitution of "aqueous" or "biodegradable" proprietary compounds for the more hazardous RCRA-regulated substances. Consequently, less LSC waste requires management as a RCRA-regulated hazardous waste.

3.3.14 Multi-EPA Waste Code Waste

Often, a waste requires more than one waste code to describe its hazardous nature. For example, an F-listed solvent may also exhibit toxicity characteristic for metals such as lead. These wastes may require special treatment for each of their hazards. Consequently, they have been

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4. One of these waste streams was identified as having EPA waste code "F024." This waste code is for a "process waste, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes." Since the waste was generated by a medical facility, it is likely mischaracterized. It is included with the Other Organic Wastes, since it is also described as having chloroform as its hazardous component.

5. One of the more than 450 LSC waste streams was identified as being Class C for radioactivity. This designation is not reasonable because the nature of LSC requires relatively low concentrations to obtain credible results, and the average concentration of ^{14}C, ^{3}H, ^{35}S, and ^{32}P reported for this waste stream is on the order of 0.005 microcurie per gram. The reported designation of this waste stream was disregarded in favor of classifying it as a Class A waste, eligible for management as a nonradioactive waste following decay of its ^{32}P and ^{35}S.

4. MANAGEMENT OPTIONS

As stated in Section 1, one of the purposes of this study is to determine which commercially generated low-level radioactive mixed wastes cannot be treated by available means and therefore must be managed in jointly regulated mixed waste disposal facilities. One primary regulatory option that can be employed to avoid disposal in a mixed waste disposal facility is the delisting petition. Three other regulatory options are available to reduce the cost of treatment or the cost of disposal: (a) a no migration variance, (b) a treatability variance, and (c) a Determination of Equivalent Treatment Petition. The following is a discussion of these options and an explanation of how each may be used to eliminate mixed waste disposal or allow treatment and management of the waste. Requirements for obtaining the exemption or variances, the historical success in obtaining the variance, and state regulations and restrictions relating to the variances are also provided.

In addition to regulatory-based options, management options relating to avoidance of waste generation and storage for decay are discussed in detail. Section 4.3 outlines options relating to treatment of waste. Available and anticipated treatment options are discussed and the vendors offering different treatment technologies are specifically identified.

4.1 Regulatory-Based Management Options

4.1.1 Delisting

4.1.1.1 Description. RCRA regulations in 40 CFR 261 list approximately 138 industrial waste streams as hazardous wastes (the F- and K-listed wastes). These wastes were listed because they exhibit one or more of the characteristics of hazardous wastes, or they contain specific components known to be toxic or otherwise hazardous at levels of regulatory concern. A waste stream from any facility that qualifies as one of the waste streams listed may be regulated as a hazardous waste. The EPA is not required to indicate on a facility-by-facility basis that the hazardous components are actually present.

In addition to these F- and K-listed waste streams, EPA designated 202 discarded commercial chemical products as acute hazardous wastes (the P-list wastes), and 445 other chemical products as hazardous wastes (the U-list wastes). To qualify as a listed waste under the P or U lists, the chemical product must be disposed of as a commercially pure grade of the chemical (any technical grade of the chemical and all formulations in which the chemical is the sole active ingredient). However, if the chemical enters into a mixture or a reaction that is part of a manufacturing process, the manufacturing process waste is NOT a listed waste unless the manufacturing process itself is listed (F- or K-listed wastes) or the waste exhibits hazardous characteristics as defined by 40 CFR 261, Subpart C (e.g., corrosivity, ignitability, reactivity, or toxicity characteristic).

EPA has recognized that a listed waste from a particular facility may not actually be hazardous. This situation may occur if:

- The waste does not contain the components or exhibit the characteristics for which it was originally listed
- The waste contains the components at relatively low levels

- The listed components are present in an immobile form.

These situations generally occur where the waste has been treated so it no longer contains the components for which the waste was originally listed, or where raw materials are different from those assumed when the regulations were drafted. Although treatment residues remain as listed hazardous waste under the "derived-from" rule, 40 CFR 261.3(c)(2)(i), EPA may modify this rule in the Hazardous Waste Identification Rule (HWIR) to be proposed in September 1995. The new HWIR may announce that treatment residuals that do not exhibit a hazardous characteristic are no longer listed waste. In the meantime, to accommodate the derived-from rule, 40 CFR 260.20 outlines a process called delisting to remove a specific generator's waste from the list of hazardous waste.

The regulations pertaining to delisting require demonstrations that the **treated** waste is no longer hazardous and, therefore, is not required to be managed in a land-based unit meeting RCRA standards. A delisting action is a **health-based** decision; in contrast, treatment standards established under 40 CFR 268 are **technology-based** standards. To qualify for delisting, some wastes may need to be treated beyond the level that is considered by EPA to be best demonstrated available technology. Where the delisting demonstration is successful, the wastes can be disposed of as nonhazardous waste for an unlimited period of time, outside the jurisdiction of all Subtitle C requirements of RCRA. In the case of mixed waste, such disposal could be in a low-level radioactive waste disposal facility regulated solely under the AEA. Disadvantages of the process include the site- and waste-specific nature of the exclusion, the extensive waste analyses required, the extensive groundwater monitoring requirements, and the comprehensive rulemaking procedures involved. The regulations do not allow submission of "generic" petitions.

There are 3 different types of delisting exclusions: standard, conditional, and upfront exclusions. A standard exclusion is granted when a petition shows that the waste meets the delisting criteria and variability of the waste composition is not of concern. When variability is a concern, a conditional exclusion may be granted. Delisting levels for key waste constituents and periodic testing to demonstrate that the waste remains nonhazardous are typical requirements under a conditional exclusion. An upfront exclusion may be granted to a facility prior to its construction. The petitioner must demonstrate that the waste will meet the delisting criteria based on preliminary treatability studies. Once the facility is operational, the petitioner must typically perform extensive verification testing to ensure delisting levels are obtained.

4.1.1.2 Requirements. Standards in 40 CFR 260.20 outline the procedures for delisting these waste streams. Figure 4-1 illustrates the delisting process. The EPA Manual, *Petitions to Delist Hazardous Wastes: A Guidance Manual* (U.S. Environmental Protection Agency, 1993) outlines specific requirements for the delisting petition based on those regulations. EPA suggests that this guide be followed closely to expedite the review process. In brief, delisting petition requirements include the following:

- A detailed description of the manufacturing process, treatment process, or other operations that produced the listed wastes. Examples may include:
  - Descriptions of production lines and major items of equipment, including details of the stages of the typical operating process
  - Descriptions of any surface and equipment preparation, cleaning, degreasing, coating or painting processes
  - Schematic diagram of all processes.

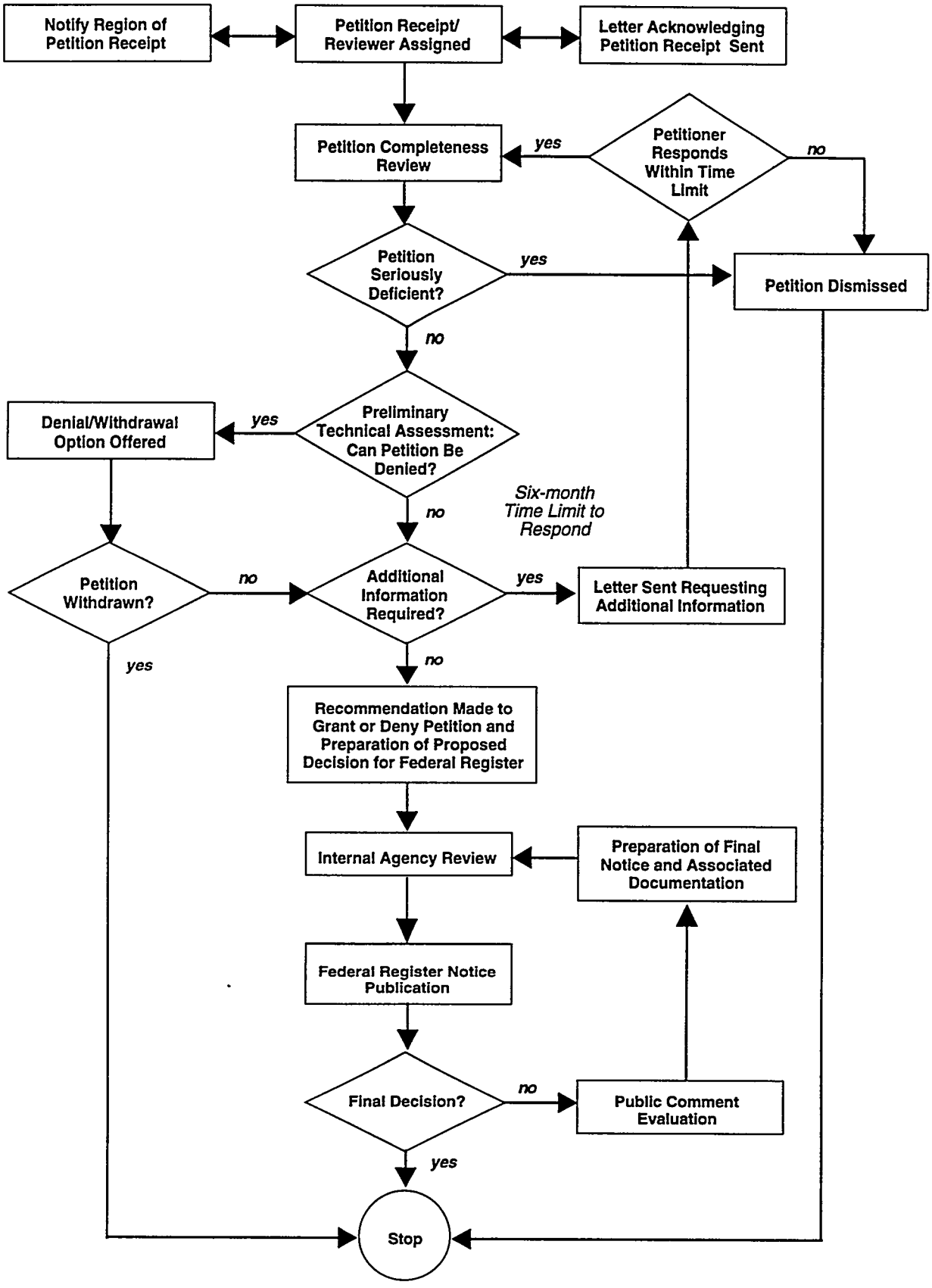

Figure 4-1. Petition review process.

- A description of the waste including a discussion of why the waste is listed as hazardous, an estimate of the average and maximum monthly and annual quantities of waste, and a description of how the waste is managed.

- A discussion of why samples collected in support of the demonstration represent the full range of variability of the petitioned waste. A minimum of four representative samples must be tested for the following:

  - Specific hazardous components for which the waste was listed
  - Four hazardous waste characteristics [or explanation as to why the characteristic(s) could not be present in the waste]
  - Appropriate leachate tests for the toxicity characteristic leaching procedure (TCLP) metals, nickel, and cyanide
  - Total concentrations of the TCLP metals and nickel
  - Hazardous components listed in 40 CFR 261, Appendix VIII, likely to be present in waste at significant levels
  - Total organic carbon (TOC)
  - Total oil and grease.

- Chain-of-custody records and quality control (QC) data for all analytical data. Analyses are expected to conform with QC procedures as described in EPA publication SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (Third Edition) (U.S. Environmental Protection Agency, 1992a).

- A list of all materials used in the manufacturing or other operating processes that produce the waste (examples include raw materials, intermediate products, by-products, products, oils and hydraulic fluids, and surface preparation materials).

- Groundwater monitoring data (required by EPA, not specifically outlined in manual).

The manual also outlines four major steps in the delisting approval process:

1. Development and submittal of the petition to EPA (or authorized state agency).

2. Review of the petition by EPA. If petitions are incomplete, EPA requests additional information. When the petition is deemed complete, EPA makes a tentative decision to grant or deny the request.

3. Publication of the proposed decision and request for public comments in the *Federal Register*. If no new significant information is received, the EPA publishes a final decision. If new information is received, the EPA reevaluates its tentative decision.

4. Final rule published in the *Federal Register*.

4.1.1.3 Historical Success Rate. Discussions with EPA officials responsible for the review of delisting petitions indicate that petition approvals are difficult to obtain. As of March 1993, 792 petitions had been received by EPA Headquarters, with a 15 to 20% approval rate among petitions found applicable. However, EPA indicates that any treatment residual that

meets current allowable concentrations under the 40 CFR 268 land disposal restriction levels usually will be a good delisting candidate. Determinations on petitions received by EPA are as follows:

Delisting Petition Determinations

Total Petitions Received	792
Granted	103
Denied	111
Withdrawn	308
Dismissed (insufficient information)	28
Inapplicable (wastes determined not to be hazardous; therefore, not subject to RCRA standards or petitioning process)	197
Referred to State Authorities	31
Active	14
	(as of March 3, 1993)

Many of the petitions had been received from F006 electroplating facilities and K061 electrical arc furnace dusts. Only a couple of petitions had been received for mixed wastes. Discussions with EPA staff indicate that most petitions are denied because they did not include sufficient information to determine that the wastes in question were no longer hazardous.

As of December 1994, 13 states and the District of Columbia have authority to approve delisting petitions. These states are Colorado, Georgia, Idaho, Indiana, Illinois, Michigan (except delisting petitions submitted in conjunction with facility closure), Minnesota, Nebraska, North Carolina, New Jersey, North Dakota, South Dakota, and Utah. Approval rates and times were similar to those for EPA. In unauthorized states, EPA also encourages petitioners to contact state authorities to determine what procedures might be necessary for delisting under state laws.

The authorized state delisting requirements must meet or surpass EPA requirements. Most of the states authorized by EPA to review delisting petitions are more stringent than EPA. The state program's authority is limited to the state granting the petition and is not transferable to another state. Therefore, a company cannot assume that the material or process delisted in Nebraska will be delisted in North Carolina or California. State authorization is appropriate for generators operating in only one state. Thus, most petitions go through EPA Headquarters in Washington, D.C., because of the unrestricted approval. Thirty-one petitions received as of March 3, 1993, were referred to state authority.

4.1.1.4 Costs. No figures have been published regarding costs; however, the EPA staff estimates that a delisting petition could cost $200,000. The cost will vary depending upon the volume of waste and the complexity of the sampling and analysis processes. Most of the cost is in

the sampling and analysis of the waste.[6] One DOE facility has spent over $500,000 in staff time and $500,000 in laboratory expenses and has yet to receive the sought after delisting.[7]

4.1.1.5 EPA Review. EPA gives most delisting petitions a processing time frame of 2 years. This schedule varies with the completeness and accuracy of the submitted petition. However, the Delisting Section of the EPA has recently suffered severe budget cuts that could make delisting petition review many times longer in the future.

To ensure that the review process runs smoothly and expeditiously, EPA offers a few suggestions. First, to evaluate the potential cost and effectiveness, the RCRA Hotline (1-800-424-9346) can send a copy of a similar facility's approved petition and background documentation. When drafting a delisting petition, the EPA manual, *Petitions to Delist Hazardous Wastes: A Guidance Manual* (U.S. Environmental Protection Agency, 1993) should be followed closely. Submittal of a "Draft Sampling Plan" prior to any waste sampling also speeds the process. The sampling plan gives information on the type of waste, the intention of sampling the waste, and the plan or procedure to sample the waste. EPA will approve and/or give suggestions to successfully complete the plan or final petition submission.

4.1.2 No Migration Variance

4.1.2.1 Description. A no migration variance is a formal decision rendered by EPA to allow land disposal of specific wastes that do not meet the treatment standards required under the land disposal restrictions. The variance is valid for 10 years after which the petition must be re-approved.

Permanent no migration disposal units must be constructed at sites where hydrogeologic and geologic factors guarantee that material will not migrate out of the unit. Manmade barriers or engineered systems are also required as reinforcement to the natural barriers. Temporary no migration units may be constructed at sites that do not exhibit the rare hydrogeologic and geologic factors, as long as the wastes are removed well before the failure of the engineered barrier system. The final land disposal restriction rule (51 FR 40572) and EPA's *No Migration Variances to the Hazardous Waste Land Disposal Prohibitions: A Guidance Manual for Petitioners* (U.S. Environmental Protection Agency, 1992b) suggest that a temporary no migration unit may serve as temporary storage for accumulating sufficient quantities of waste for treatment or disposal.

A generator of mixed waste may find this option useful as temporary long-term storage until technology provides adequate treatment or the required period under the storage for decay option is completed (see Section 4.2.3). It should not be considered for permanent disposal because the variance is subject to renewal every 10 years.

The no migration petition requirements are substantial and costly with little likelihood of success. To date, EPA has received 31 petitions, with no petitions granted. Given the costly and seemingly futile nature of the no migration variance, its usefulness as a regulatory management option is questionable.

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6. Personal communication with Jim Kent, Chief, Delisting Section, U.S. Environmental Protection Agency, Washington, D.C., December 6, 1994.

7. Personal communication with Maurice Higeura, Raytheon Environmental, Richland, Washington, December 23, 1994.

- A description of the process(es) and feed materials generating the waste and an assessment of whether such process(es) or feed materials may produce a waste that is not covered by the demonstration.

- A description of the waste sufficient for comparison with the wastes considered by the agency in developing BDAT, and an estimate of the average and maximum monthly and annual quantities of waste covered by the demonstration. This information can be obtained from the appropriate EPA BDAT background document. These documents are listed on page 40636 of the November 7, 1986, *Federal Register*, page 31210 of the August 17, 1988, *Federal Register*, and page 26646 of the June 23, 1989, *Federal Register*. No similar list of documents was published for wastes covered by the third-third rule (Elsevier Science Inc., 1994).

- If the waste has been treated, a description of the system used for treating the waste, including the process design, operating conditions, and an explanation of the reasons the treatment standards are not achievable or are based on inappropriate technology for treating the waste. (Note: The petitioner should refer to the appropriate BDAT background document as guidance for determining the design and operating parameters that the agency used in developing treatment standards.)

- A description of the alternative treatment systems examined by the petitioner (if any), a description of the treatment system deemed appropriate by the petitioner for the waste in question, and, as appropriate, the concentrations in the treatment residual or extract of the treatment residual (using the TCLP) that can be achieved by applying such treatment to the waste.

- The dates of the sampling and testing.

- A description of the methodologies and equipment used to obtain representative samples.

- A description of the sample handling and preparation techniques, including techniques used for extraction, containerization, and preservation of the samples.

- A description of the tests performed (including results).

To support a petition for a treatability variance, EPA suggests that the petitioner (59 FR 48023):

- Collect and analyze at least four samples of the untreated and treated waste to fully characterize the effect of the available treatment technology. The exact number of samples is determined during EPA's review of the petition.

- Ensure that simple pretreatment methods are not overlooked by making an investigation and report on available pretreatment steps that could significantly improve the effectiveness of the treatment being conducted (e.g., settling to reduce total suspended solids). An extensive or expansive engineering analysis is not required here.

- Make a good faith effort, based on the available treatment process knowledge, to explain why the treatment standard is not achievable for the waste. Again, an expansive engineering analysis is not required.

Treatability variance petitions are reviewed by EPA Headquarters. One copy of the petition should be sent to the Administrator, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington D.C. 20460. An additional copy marked "Treatability Variance" should be submitted to Chief, Waste Treatment Branch, Office of Solid Waste (WH-565), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460 as specified in 51 FR 40606.

In determining whether a variance should be granted, the EPA will first look at the design and operation of the treatment system being used. If EPA determines that the technology to be used is consistent with regulatory guidelines, it will evaluate the waste to determine if the waste matrix or physical parameters are such that the revised technology properly reflects treatment of the waste.

In cases where more than one technology is applicable to a waste, the petitioner would have to demonstrate that the treatment standard cannot be met using any of the technologies, or that none of the technologies is appropriate for treatment of the waste.

After the EPA has made a determination on the petition, its proposed decision will be published in the *Federal Register*, followed by a 30-day comment period. After review of the public comments, EPA publishes its final determination in the *Federal Register* as an amendment to the treatment standards in 40 CFR 268. Site-specific variances are exempt from these rulemaking procedures.

4.1.3.3 Historical Success Rate. As of December 1994, 25 treatability variance petitions have been received by EPA Headquarters. Of that number, 3 facilities received variances, 16 were withdrawn, and 6 to 10 are pending. The petitions concerned the following types of waste: wastewater treatment sludges from electroplating operations (EPA F006); chromium contained in asbestos (EPA D007); API separator sludge (EPA K051); and soil and debris from cleanup operations. No petitions have been submitted involving mixed waste.

Successful treatability variances were granted to Craftsman Plating and Tinning Corporation and Northwestern Plating Works, Inc., two electroplating wastewater facilities located in Chicago, Illinois (56 FR 12351). Although both facilities were found to be properly operating well-designed BDAT treatments, they could not meet total cyanide standards (590 mg/kg) for their sludges. Both of the facilities are achieving an EPA established 0.86 mLr/L **amenable** cyanide standard in the effluent (standard for F006 wastewater) exiting the alkaline chlorination systems. In achieving these levels, the operating results will be used as the basis for alternative treatment standards for total cyanides in the sludges that are generated after alkaline chlorination treatment. EPA has determined that the appropriate alternative total cyanide standard for the Craftsman facility is 1,800 mg/kg and the Northwestern facility is 970 mg/kg.

4.1.2.2 Requirements. Specific statutory language requires persons applying for a no migration petition to demonstrate "to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the disposal unit or injection zone for as long as the wastes remain hazardous" [40 CFR 268.6 (a)]. The EPA interpreted this language as allowing no migration variances only if hazardous components will not exceed EPA-approved human health-based levels (or environmentally protective levels where appropriate) beyond the boundary of the disposal unit. In most cases, the disposal unit boundary is defined as the outermost limit of engineered components, but it may be defined differently in some site-specific cases.

The No Migration Guidance outlines critical components that should be included in the application. These components include:

- Waste Description
- Facility Description
- Site Characterization
- Monitoring Plans
- Waste Mobility Modeling
- Assessment of Environmental Impacts
- Prediction of Infrequent Events
- Quality Assurance and Quality Control (QA/QC).

Petitions are submitted to and reviewed by EPA Headquarters with assistance from EPA regional and state personnel (no states have approved petition review programs). The reviewers perform an initial completeness review. Once the initial review is completed, EPA will decide if additional information is needed to make a decision on the petition, and will request such information through a letter to the petitioner.

Once the reviewers have received all necessary information, a formal technical review will be performed. Upon completion, a formal decision to grant or deny the application will be made. If the tentative decision is to grant the petition, the EPA will publish a notice in the *Federal Register* describing its intent. If the tentative decision is to deny the petition, a letter will be sent to the petitioner of the intent to deny and offer the opportunity to withdraw the petition. If the application is not withdrawn, the EPA will publish a *Federal Register* notice describing its intent.

4.1.2.3 Historical Success Rate. Discussions with EPA Headquarters officials responsible for review of no migration petitions for disposal indicate that the approval process is time consuming and resource intensive with little likelihood of petition approval. As an example, one petition from a petroleum refinery consisted of 17 4-inch binders. EPA has not received a new petition in years.[8] The petitions are almost exclusively from the petroleum refining industry.

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8. Personal communication with Newman Smith, EPA Office of Solid Waste, Permits, and State Programs Division, Washington, D.C., December 15, 1994.

No petitions have been received for units accepting commercially generated mixed wastes; however, one petition pertained to a demonstration facility for disposal of transuranic mixed wastes (Waste Isolation Pilot Project).

4.1.3 Treatability Variance

4.1.3.1 Description. A treatability variance allows a generator or treatment facility to dispose of a waste under less stringent treatment levels than the levels specified in the land disposal restrictions. This option is appropriate only if a waste cannot be treated to the specified treatment standard or if the treatment technology on which the standard is based is inappropriate for the waste as specified in 40 CFR 268.44(a). For example, wastes with a complex matrix, such as mixed waste, may be difficult to treat either to the acceptable level or by the required treatment method, because the waste is significantly different from the wastes considered when EPA established the standards. With regard to mixed waste, a treatability variance may be appropriate for small volumes of Class B and C wastes, or other wastes where radioactivity concerns tend to dominate waste management alternatives. Another example is a variance for treatment of internally contaminated lead acid batteries that currently has a standard of thermal recovery in secondary lead smelters.

With the promulgation of Phase II of the Land Disposal Restrictions, generators must also treat to the most stringent level under the universal treatment standards for underlying hazardous constituents reasonably expected in the waste (59 FR 47982, September 19, 1994) (See Section 4.2.1). This rule has the effect of making mixed waste difficult to treat in more instances than previously required. Therefore, the treatability variance has the potential to become an even more important regulatory option for the management of mixed waste.

To be granted a treatability variance, a petitioner must show that "because the physical or chemical properties of the waste differs significantly from wastes analyzed in developing the treatment standard, the waste cannot be treated to specified levels or by the specified methods" [40 CFR 268.44(a)]. If the variance is granted, the generator or treatment facility is free to use the EPA-approved alternative treatment standard. Variances are not approved based on evidence that adequate BDAT treatment capacity is unavailable.

4.1.3.2 Requirements. Under 40 CFR 260.20 treatability variance petitions must include:

- The petitioner's name, address, and statement of interest in obtaining a treatability variance
- A description of the proposed action
- A statement of the need and justification for the proposed action, including any supporting tests, studies, or other information.

In addition, EPA requests that the following information also be included in treatability variance petitions (51 FR 40606):

- The name, address, and EPA ID number of the facility generating the waste, and the name and telephone number of the plant contact.

4.1.3.4 Costs. Review time for the petitions has varied between 4 months and 1 year. Average cost estimates are $40,000 for gathering of appropriate information and development of the petition.[9] Total cost of the submittal depends on the cost of the demonstration.[10]

EPA review of treatability variances has been severely limited because of budget constraints. No agency action has been taken on pending applications in over 3 years.

4.1.3.5 Combination Treatability Variance/Delisting Petition. On one occasion, EPA issued a treatability variance and delisted the treatment residue under a single application process. Ordinarily, the derived-from rule causes the residue from a treated listed waste to remain a listed waste [40 CFR 261.3(2)(i)]. However, when a treatment process works so well that the treatment residue is rendered nonhazardous, EPA may also delist the residue. This streamlined process was used for the electric arc-furnace dust waste stream. A high-efficiency incineration process was demonstrated to work well enough to justify the removal of the residue from the hazardous waste list.

Although there are no regulatory procedures for the combined process, both the treatability variance and delisting procedures must be followed. It should be noted, however, that the combined procedure is available only when it can be demonstrated that a technology renders a residue nonhazardous. This procedure is an exception rather than the rule.[11] A combined treatability variance/delisting petition should be sent to Richard Kinch at the Office of Solid Waste, Waste Management Division, 401 M Street S.W., Washington, D.C. 20460.

4.1.3.6 Determination of Equivalent Treatment Petition. Another related regulatory option is a "Determination of Equivalent Treatment" petition under 40 CFR 268.42(b). According to the rule, "[a]ny person may submit an application to the Administrator demonstrating that an alternative treatment method can achieve a measure of performance equivalent to that achieved by methods specified [in the LDR rules]. The applicant must submit information demonstrating that his treatment method is in compliance with federal, state, and local requirements and is protective of human health and the environment."

Determination of Equivalent Treatment petitions are usually submitted when a material carries a wide range of waste codes, which is often the case for mixed waste. The petitions are also useful when the regulated material is no longer in its original form, such as a material carrying a code for a liquid, but the material is now a solid and the liquid treatment is no longer appropriate.

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9. Personal communication with Elaine Eby, Chief, Treatability Variance Section, U.S. Environmental Protection Agency, Washington, D.C., May 9, 1991.

10. Personal communication with Shaun McGarvey, Treatability Variance Section, U.S. Environmental Protection Agency, Washington, D.C., December 6, 1994.

11. Personal communication with Richard LaShier, U.S. Environmental Protection Agency Office of Solid Waste, Characterization and Assessment Division, Washington, D.C., December 15, 1994.

According to EPA personnel, Determination of Equivalent Treatment petitions are more common than treatability variance petitions.[12] They also carry the advantage of being more likely to be granted than denied. This is largely because the treatment is a collaboration or negotiated process between the petitioner and EPA.

4.1.4 Host State Regulations and Restrictions

An analysis was performed comparing current standards in declared host states for preparation and submittal of the delisting petition, no migration variance, and treatability variance to the Federal standards for preparation and submittal. With regard to the delisting petitions, four of the thirteen host states are authorized to review and approve delisting petitions (Illinois, Nebraska, New Jersey, and North Carolina). In all of those states, requirements for preparation of the petition are identical to those of the Federal standards. The remaining nine host states have standards for delisting petitions that are equivalent to the Federal program, but EPA has not authorized the states to review and approve the petitions. Review and approval authority in those states remains with EPA Headquarters. (When EPA retains delisting authority, states must concur with the EPA decision before the decision becomes final.)

All host states except California, Connecticut, Nebraska, and Texas have or are adopting standards for no migration petitions equivalent to the Federal standards; however, no states are currently authorized to review and approve the petitions. EPA Headquarters reviews and approves all no migration petitions, with states' concurrence. States that specifically omitted no migration petitions from their RCRA program intentionally excluded the no migration petition as a regulatory option. Such an omission of a Federal variance is allowable, as states may adopt stricter standards than the Federal program.

All host states except Texas have adopted or are adopting equivalent standards for treatability variances; however, no states are authorized to review and approve the variances. EPA Headquarters reviews and approves all treatability variances (with state concurrence). Table 4-1 summarizes these applicable state regulations in each potential host state.

4.2 Management Options that Avoid Mixed Waste Generation

An often overlooked management option is to avoid generating mixed waste altogether. Two methods can avoid mixed waste generation: material substitution and process modification. Storage for decay can also be considered mixed waste avoidance, although technically mixed waste is generated. However, the waste ceases to be mixed waste following the decay period because its radioactivity cannot be measured by normal means.

4.2.1 Material Substitution

Material substitution is one of the most desirable options for preventing the formation of mixed waste. The concept of material substitution involves replacing a chemically hazardous reagent with one that is not hazardous. For example, water-based solvents can be used instead of solvents such as toluene or chloroform. As substitutes for radioactive tracers, techniques using enzymes and fluorescent labels can be used to reduce the radioactive wastes.

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12. Personal communication with Shaun McGarvey, Treatability Variance Section, U.S. Environmental Protection Agency, Washington, D.C., December 6, 1994.

Table 4-1. Summary of requirements for variances in declared host states.

State	Delisting Petition	No Migration Variance	Treatability Variance	EPA Authorization to Regulate Mixed Waste
California	California Administrative Code, Title 22, Division 4.5, Chapter 10, Section 66260.200	(Intentionally excluded)	Chapter 18, Section 66268.44	Yes
Connecticut	Regulations of Connecticut State Agencies, Title 22a, Chapter 449(c), Section 100	Section 22a-449(c)-108 (Expressly excluded)	Section 22a-449(c)-108	Yes
Illinois	Illinois Administrative Code, Title 35, Subtitle G, Chapter I, Section 720.122[a]	Section 728.106	Section 728.144	Yes
Massachusetts	Code of Massachusetts Regulation, Agency 310, Chapter 30, Section 142	Section 30.755	Section 30.775	No
Nebraska	Nebraska Department of Environment Control, Title 128, Chapter 6, Section 003.01[a]	(Not included)	Chapter 20, Section 003	Yes
New Jersey	New Jersey Administrative Code, Title 7, Chapter 26, Section 8.17[a]	--[b]	--[b]	No
New York	New York Compilation of Rules and Regulations, Title 6, Chapter 370.3(c)	Section 376.1(f)	Section 376.4(e)	Yes
North Carolina	North Carolina Administrative Code, Title 15A, Subchapter 13A, Section .0003(b)[a]	Section .0012(a), Part 268	Section .0012(c), Part 268	Yes
Ohio	Ohio Administrative Code, Title 3745, Chapter 50, Section 221	Section 3745-59-06	Section 3745-59-44	Yes
Pennsylvania	Pennsylvania Code, Title 25, Article VII, Section 260.22	--[b]	--[b]	No
South Carolina	South Carolina Code of Regulations, Chapter 61-79, Section 260.22	Section 268.6	Section 268.44	Yes
Texas	Texas Administrative Code, Title 31, Part IX, Chapter 335, Section 335.346	Section 335.431(c) (Intentionally excluded)	Section 335.431(c) (Intentionally excluded)	Yes
Washington	Washington Administrative Code, Title 173, Section 173-303-072	Section 173-303-140(6)	Section 173-303-140(6)	Yes

a. Delisting review authority delegated to these states. In other states, EPA retains the authority to delist a hazardous waste.
b. States' regulations being proposed; Federal standards apply until final issuance.

The constraint on material substitution is that the possible substitute must perform comparably to the material it is replacing. For instance, if chloroform is used in an extraction procedure, not only must the substitute be capable of extracting equally well, but it also must not interfere with the process, such as by introducing water or an undesirable chemical into the extraction process.

Material substitution must be evaluated on a case-by-case basis. The user needs to evaluate the economic and technical desirability of substitution. Also, users may not be interested in reducing mixed waste at the expense of tampering with established protocols. An example of such reluctance is substitution of a nonhazardous scintillation cocktail for the typically toluene- or xylene-based cocktails. In spite of the fact that nonhazardous cocktails cost approximately 10% less than their hazardous counterparts, the industry continues to use the hazardous cocktails. Continued use is a result, in part, of the belief that nonhazardous cocktails do not perform as well as their hazardous counterparts.

Another possible option is substituting a radionuclide with a shorter half-life for one that has a longer half-life. For example, if ^{32}P (with a half-life of 14.3 days) could be substituted for ^{3}H or ^{14}C (with half-lives of 12.3 and 5,730 years, respectively), the radioactive portion of the waste could be stored until it is no longer considered to be radioactive. This option is discussed in greater detail in Section 4.2.3, Storage for Decay.

4.2.2 Process Modifications

Process modifications can reduce the volume or degree of hazard (either chemical or radiological) of the waste stream. The questions to ask when determining if a process modification is required are:

1. What step in the process actually produces the mixed waste?

2. What is the purpose of the step that produces the mixed waste?

3. Are there modifications that can be made to the process or alternative process that will acceptably perform the objective of the original process step, while at the same time reduce the volume or hazard of the waste stream?

For example, mixed wastes generated from decommissioning a facility can be minimized if, during the design phase, proper care is taken to ensure that materials and equipment that are likely to become radioactively contaminated do not contain any components that will be considered hazardous when it is time to dispose of them.

Other examples of reformulating or redesigning a process include:

- Reformulating a process by changing from a uranium/antimony catalyst to an iron/bismuth catalyst for the production of acrylonitrile

- Redesigning a process by changing from solvent stripping of paint and coatings from contaminated surfaces to sand blasting the paints and coatings using pelletized dry ice (from carbon dioxide)

- Redesigning a parts cleaning process by incorporating ultrasonic cleaning instead of cleaning the parts with methylchloroform or by using pelletized dry ice for decontamination

- Replacing molten salt or lead baths with induction heating for heat-treating uranium billets

- Using small-bore tubing on high-pressure liquid chromatography (HPLC) to reduce the amounts of solvents required to perform analytical procedures.

Changing procedures and providing more detailed guidance concerning material handling and waste segregation can result in significantly reduced wastes for a minimal cost. For instance, a mixed waste is often generated as a result of the way a chemical or material is used, handled, or stored. Operational practices and procedures should be examined to determine if changes can be made. The questions to ask when determining whether procedural changes are appropriate include:

1. Does any of the mixed waste result from the way a material is used, handled, or stored?

2. What is the objective of the usage, handling, or storage practice that generates the mixed waste?

3. How can the usage, handling, or storage be changed to acceptably meet the objective identified in the second question while at the same time reduce or eliminate the hazard or volume of the waste stream?

For example, nuclear utilities have enforced a strict policy of limiting personnel and materials in radiologically controlled areas by restricting those areas to only essential activities and maintaining strict maintenance procedures. These procedural changes have reduced the quantity of waste that becomes contaminated low-level radioactive waste. Further, the storage and use of materials that can potentially result in a RCRA hazardous waste should be reduced or eliminated from these areas to the greatest extent possible.

Another change in practice would be in the area of inventory control. Facilities should consider purchasing based on the amount of material needed rather than purchasing based on price per volume. If a laboratory determines that it only uses one pint of a solvent-based reagent before the shelf life expires and it is currently obtaining one-gallon containers that end up radiologically contaminated, the laboratory should request one-pint containers of this material in the future. If the current vendor cannot provide the needed volume, the laboratory should change vendors or order a large container of the material to share among similar laboratories, if possible, before placing the product in a radiologically controlled area.

4.2.3 Storage for Decay

The radioactive components of some mixed waste can decay to levels that are not detectable. Upon specific approval from the NRC or an Agreement State, such wastes may be disposed of as a hazardous waste without regard to its radiological content if acceptable to the hazardous waste management facility. This process typically requires 10 to 12 half-lives of the longest-lived radionuclide present. NRC considers storage for decay appropriate for materials

with half-lives of less than 65 days. Of the most frequently encountered radionuclides in LLW, only ^{32}P, ^{35}S, ^{86}Rb, ^{203}Hg, ^{111}In, ^{76}As, ^{58}Co, ^{131}I, ^{125}I, ^{123}I, ^{99}Tc, ^{192}Ir, and ^{59}Fe have half-lives of 120 days or less. With estimated costs for disposal as high as $15,000 per cubic foot, storage for decay of materials with even longer half-lives may be economically and technically achievable. However, storage of hazardous waste is prohibited under RCRA Section 3004(j) unless it is for the purpose of "accumulating sufficient quantities to allow for the proper treatment, management, and disposal of the land disposal restricted wastes." NRC also discourages the use of storage as a long-term waste management option. For example, only 2.5% of the mixed waste generated by the Southwestern compact region was being managed using storage for decay in 1989, and the National Profile describes only limited use of this management option. Nonetheless, substitution of a short-lived radionuclide instead of a longer-lived counterpart can substantially reduce the volume and radiotoxicity of mixed waste requiring jointly regulated management.

4.3 Management Options Involving Treatment

If mixed waste generation cannot be avoided, treatment is required. Depending on the treatment chosen, the hazardous component may be separated from the radioactive components, may be destroyed, or the radioactive component may be decayed to nondetectable levels as discussed above. The result of such treatment is to produce a waste that can be more easily disposed of. In this section, the currently available treatment options for mixed waste are discussed as well as treatment options that are anticipated to become available within the next 5 years. Each of the vendors who offer treatment options for mixed waste are discussed. The treatment processes that each of these vendors provides are described and the types of waste that each vendor is currently accepting are also discussed. Section 4.3.2 describes the treatment options under development by DOE.

4.3.1 Commercially Available Treatment Options

There are several commercial vendors who are currently licensed and permitted to provide mixed waste treatment and disposal services and one vendor that anticipates obtaining permits for the processing of mixed waste within the next year. Each of these vendors is described below along with information on the types of wastes they are currently accepting for treatment.

4.3.1.1 Diversified Scientific Services, Inc. (DSSI). DSSI operates a 22,000 square-foot Solvent Processing Facility located in Kingston, Tennessee. This facility consists of a beneficial reuse complex that processes various liquid waste solvents by combusting them in an industrial boiler to generate electricity. DSSI currently has five overlapping permits that allow them to accept waste solvents with EPA waste codes of D001, D006 to D043, F001 to F005, and numerous U- and P-listed materials. DSSI accepts radioactive wastes with atomic numbers of 1 through 83 as well as small amounts of some transuranics. The limit on nuclides established in DSSI's current Radioactive Material License are established based on a total combined nuclide activity that cannot exceed 10 curies at any one time. A limit of 1 curie is established for nuclides with atomic numbers between 1 and 83 that are not specifically described in the license. In addition, maximum activity limits or mass limits are established for some individual nuclides, including uranium and plutonium. Appendix C-1 lists the EPA waste codes and nuclides accepted at DSSI. Also listed in Appendix C-1 are the acceptable limits for waste parameters for metals, polychlorinated biphenyls (PCBs), halogens, sulfur and phosphorus content, and physical properties. Wastes are accepted at DSSI in small containers of 5 gallons as well as in 30, 55, or 85 gallon drums, portable tanks, and bulk tankers.

In addition to the limits on radionuclide waste activity described above, DSSI's license also contains a limit of no more than a total of 22.5 curies of activity from ^{3}H and ^{14}C used as fuel in a single year and no more than 0.05 millicuries of ^{3}H and ^{14}C activity per gram of fuel combusted. The cost to the generator to dispose of low-level mixed waste fuel at DSSI could be as low as $30 per gallon with actual costs varying, based on the waste composition and the case specifics.

The point of contact for DSSI is Larry L. Hembree, Customer Service Supervisor, P.O. Box 863, Kingston, Tennessee, 37763, (615) 376-8714.

4.3.1.2 Envirocare of Utah, Inc. (Envirocare). Envirocare operates treatment and landfill disposal facilities at a site 75 miles west of Salt Lake City, Utah. The facility was originally given a permit in 1988 to dispose of NORM. In 1990, the facility received a RCRA Part B Permit, and in 1993 it received a Mixed Waste Treatment Permit and an NRC 11e.(2) [i.e., mill tailings] Disposal License.

In addition to providing disposal services for low-activity radioactive and mixed waste, Envirocare also operates a Mixed Waste Treatment Facility. The technologies available at this facility are chemical stabilization, chemical oxidation, chemical reduction, chemical deactivation, and neutralization. The corresponding treatment codes from 40 CFR 268.42 Table 1 apply to these activities: STABL, CHOXD, CHRED, DEACT, and NEUTR. The basic components of the treatment facility are solid separation and size reduction equipment, a blender unit, a mixing unit, reagent, and process water storage tanks. Envirocare has applied for, and expects to receive, a Part B permit for macroencapsulation (treatment designation MACRO) of contaminated lead shielding. In this process, a surface coating material such as a polymeric organic material is applied to substantially reduce surface exposure to potential leaching media.

Envirocare can accept mixed wastes with EPA waste codes D001 to D043, F001 to F012, F019, F024, F028, K011, K013, K050 to K052, K061, K069, and many P- and U-listed wastes. Appendix C-2 contains copies of information from the Envirocare Part B permit that lists acceptable waste codes. Envirocare can accept approximately 81 nuclides under its current Radioactive Material License. Limits on each of these nuclides are established based on maximum average activity concentrations in the waste for disposal.

The maximum capacity of the mixed waste treatment system is 150 tons of waste per day. Only one waste stream can be processed through the mixed waste treatment system at one time. These limits restrict the ability and incentive of Envirocare to process small quantity waste streams. Waste can be received at the Mixed Waste Treatment Facility in a variety of containers such as dump trucks, roll-off containers, and 55-gallon drums. Envirocare does not provide information on generator costs for waste disposal, but prefers to deal with cost issues on a case-specific basis.

The point of contact is Envirocare of Utah, Inc., Susan P. Rice, Program Manager, 46 West Broadway, Suite 240, Salt Lake City, Utah, 84101, (801) 532-1330.

4.3.1.3 Perma-Fix of Florida, Inc. (PFF). PFF operates two waste management processes at a 7.6 acre site in an industrial park in Gainesville, Florida. PFF holds a Part B permit for operation of a TSD facility and is authorized to handle certain mixed wastes by the Florida Department of Environmental Protection and the Florida Department of Health and Rehabilitation Services, under agreement with the NRC.

The first waste management process provides handling and disposal of liquid scintillation vials that are regulated as mixed waste. In this process, the vials are processed and prepared for use as a supplemental fuel in a rotary cement kiln operated by Oldover Corporation located at Green Cove Springs, Florida. The other waste management process provides handling, storage, and disposal of hazardous and nonhazardous wastes such as oil filters, air filters, and rags that are prepared for further processing and disposal at RCRA landfills.

PFF holds a Radioactive Materials License that allows liquid scintillation materials to be received and processed subject to a requirement that these materials be received, processed, and transported to Oldover in concentrations no greater than 0.05 microcuries per gram of medium. A total of 30 nuclides are permitted for liquid scintillation materials in the current license. The radioactive material license and Part B permit restrictions are located in Appendix C3.

PFF is in the process of applying for licensure to process additional liquid scintillation nuclides and additional chemicals other than liquid scintillation fluids that are contaminated with radionuclides. They are also seeking to obtain Part B permit modifications to allow additional waste codes and additional treatment capabilities including stabilization. If obtained, these additional capabilities would provide the ability to process scintillation fluids with a lower Btu content and a higher activity level and to process and ship wastes to DSSI after processing at PFF.

PFF could charge a waste generator approximately $180 to dispose of a 7.5-cubic-foot drum of liquid scintillation vials. The actual generator cost would depend on the waste stream specifics, the waste quantity, and the generator location.

The point of contact is Perma-Fix of Florida, Ben Warren, 1940 N.W. 67th Place, Gainesville, Florida, 32653, (904) 373-6066.

4.3.1.4 NSSI/Recovery Services Inc. (NSSI). NSSI operates a facility in a light industrial area in southeast Houston, Texas that receives and processes radioactive, hazardous, and mixed wastes. The facility has been in operation since 1971 and was issued a Part B permit in October 1990. NSSI is permitted to perform blending of wastes for offsite use as fuel; consolidate waste containers into lab packs; perform neutralization, oxidation, reduction, and other chemical reactions to render wastes less hazardous for offsite disposal; recycle solvents; perform centrifugation, filtration, and ion exchange in portable equipment; solidify or stabilize waste in containers; shred containers for recovery of the contents; consolidate miscellaneous compatible wastes; perform chemical and mechanical treatment in portable equipment to separate, settle, and clarify; remove hazardous constituents by absorption on solid media; dry solids to meet offsite disposal criteria; and recover waste chemicals for reuse or resale. The NSSI permit allows processing in a total of 20 tanks with a combined capacity of 58,530 gallons. A total of 179,093 gallons of container storage is provided in 4 container storage areas.

NSSI also holds a Radioactive Material License that allows a maximum activity of 2 curies for Group I nuclides as defined under Texas Regulations for Control of Radiation (TRCR) 44.5(a), 20 curies for Group II, 200 curies for Group III, and 2,000 curies for Group IV. In addition, a total activity of 2,000 curies is permitted for sealed radioactive sources received as radioactive waste. The radioactive material license and Part B permit restrictions are located in Appendix C4.

NSSI cannot provide final waste disposal costs without knowing the waste stream specifics, the state from which the waste is generated, and the final disposal site for the waste. However, the cost to the generator for performing the RCRA treatment and converting the treatment residue to a stabilized waste form that would pass the TCLP test for land disposal might be $100 to $150 per gallon of waste.

The point of contact is NSSI/Recovery Services Inc., Robert D. Gallagher, President, P.O. Box 34042, Houston, Texas, 77234, (713) 641-0391.

4.3.1.5 Scientific Ecology Group, Inc. (SEG). SEG is currently licensed for processing of radioactive waste and has applied for a Part B permit for processing low-level radioactive mixed wastes. Its present treatments include compaction and incineration. SEG is applying for permits to operate both incineration and steam reforming processes for the treatment of mixed wastes. The steam reforming process, as proposed by SEG, will chemically convert organic compounds to CO, H_2, CO_2, H_2O, and CH_4 by using steam reforming chemistry. These reforming reactions occur in a near oxygen-free environment in the presence of high temperature and superheated steam. Extremely high conversion of organics to conversion products are achieved with steam reforming. A significant advantage of this process is that it can be used to convert organic compounds contained within a solid matrix, thus allowing the processing of mixed waste forms that are not presently treatable using conventional incineration or combustion treatment. Steam reforming is not expected to be used routinely to treat waste having ^{14}C or ^{3}H concentrations greater than 2 millicuries per drum.

SEG has a current projected rate for treatment of a typical dry active waste of $300 per cubic foot. This projected cost is dependent on a number of factors that cannot currently be predicted.

The point of contact is Scientific Ecology Group, Inc., Tim Hallman, P. O. Box 2530, Oak Ridge, Tennessee, 37830, (615) 376-8169.

4.3.2 Treatment Options Under Development by DOE

The DOE Office of Technology Development has sponsored a Mixed Waste Integrated Program (MWIP) to assume responsibility for the research, development, demonstration, testing, and evaluation of new and emerging technologies for application to treatment and disposal of mixed low-level radioactive waste generated by DOE. The MWIP has identified technology areas that have the potential to be incorporated as treatment steps for mixed waste. Some of the technologies currently under investigation include biodegradation, freeze crystallization, biocatalytic destruction of nitrates, ion exchange and acid leaching for mercury removal, thermal treatment technologies for waste destruction such as plasma arc incineration and steam reforming, thermal vitrification, and thermoplastic encapsulation.

The mission of the MWIP is to identify, develop, and demonstrate technologies that treat DOE mixed low-level radioactive wastes into forms suitable for disposal. To be included in the MWIP, technologies must have improved performance, reduced risk, and minimized life-cycle costs over existing technology or provide treatment for waste streams for which no current treatment technology exists (Bloom and Berry, 1994). For example, biodegradation is being used to treat the hazardous component of uranium-contaminated liquid scintillation counting fluids at Mound Laboratories.

5. SPECIFIC WASTE STREAM STRATEGIES

Each of the waste streams identified as being generated in 1990 or in storage on December 31, 1990, was compared against the acceptance criteria of the available commercial treatment facilities, including those treatments that are likely to become available in the near future. The management strategy outlined in Figure 5-1 was applied to each waste stream.

Most of the **ignitable, corrosive, and biological** mixed wastes are likely to be treated out of existence, with few residues requiring disposal as jointly regulated mixed waste. Most ignitable wastes could be treated at DSSI subject to the activity limits described in Section 4.3; corrosives could be treated on site or by NSSI; and biological wastes could be treated by steam reforming. Some of the ignitable paint wastes would appear to require blending with other liquids before treatment at DSSI. Absorbed liquids and other solid ignitable wastes would be treatable when steam reforming technology becomes available subject to activity limits. Because these are characteristic wastes, their treatment residues are considered nonhazardous and would be disposable as solely low-level radioactive waste after treatment.

Very few **reactive wastes** are treatable by commercially available means because vendors such as DSSI, SEG, and PFF do not accept reactive waste. Envirocare accepts reactive D003 wastes for treatment but is limited in the types of treatments available and in the minimum quantity of waste that it can process as described in Section 4.3.1.2. As a result, Envirocare does not accept all of the D003 waste currently being generated. Relatively small volumes of reactive waste are generated, further reducing the likelihood that a commercial vendor will develop a treatment technology. The most likely treatment outlet for much of the reactive waste is via in-house, permitted, customized treatment by the generator. Such treatment would require a RCRA Part B Permit. Following DEACT, the required treatment under 40 CFR 268 and conformance to the universal treatment standards, the waste will no longer be a RCRA-regulated waste, allowing disposal as solely LLW. The National Profile data suggest that 13.15 cubic meters of generated reactive waste and 73.52 cubic meters of stored reactive waste would not have a currently available commercial treatment option.

Most **characteristic metal wastes** can be treated at NSSI by stabilization and precipitation and at Envirocare by macroencapsulation. Envirocare of Utah is expecting to receive a permit for macroencapsulation of lead shielding wastes. Among the wastes considered to be untreatable by available commercial vendors are retired brachytherapy sources in shielded casks, all of the nonaqueous mercury-contaminated wastes, and spent reactor control rods containing cadmium. Lead used as shielding is not considered by EPA to be a waste because the lead is being used as shielding and is not a waste. However, at least one state jurisdiction retains its right to be more stringent and regulates lead as a hazardous waste whether it is being used for shielding or not. Because of the high activity of the brachytherapy sources (84 curies), this waste was considered to not have an available treatment option. Of the 258.9 cubic meters of generated waste and 267.1 cubic meters of stored characteristic metal wastes, only 8.5 cubic meters of generated waste and 32.11 cubic meters of stored waste do not have an available treatment option.

Most of the **characteristic organic waste** will likely be treatable now or in the near future, when steam reforming becomes available. The 1.45 cubic meters identified as untreatable waste consisted of compacted trash with activities of ^{3}H, ^{14}C, and ^{125}I in excess of those allowable for steam reforming or supplemental fuel. Consequently, little of the 38.23 cubic meters of characteristic organic waste should require jointly regulated land disposal as mixed waste.

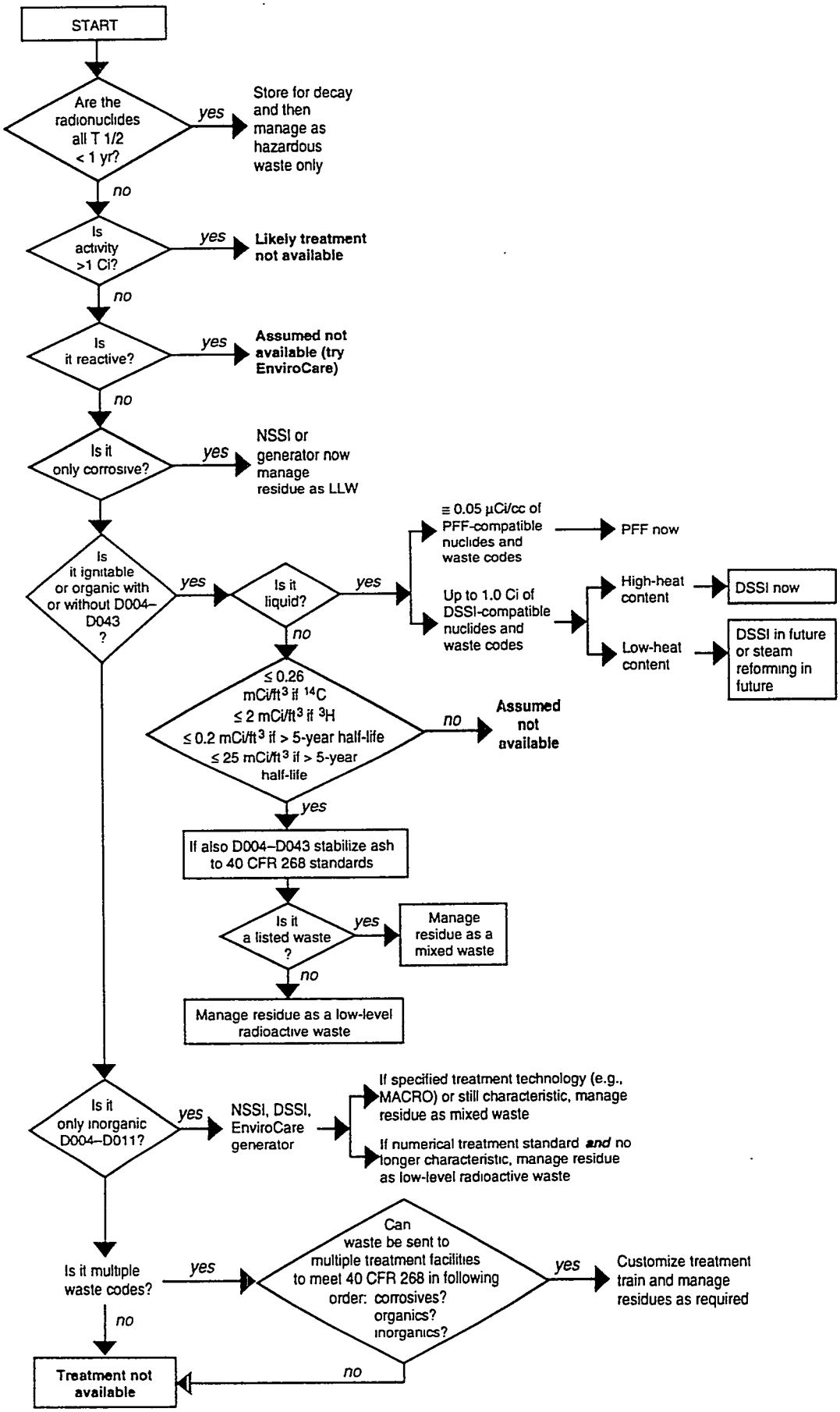

Figure 5-1. Treatment schematic.

Of the 99.7 cubic meters of **F001 and F002 wastes** that were generated in 1990, only 9.91 cubic meters cannot be treated. This untreatable waste consists of (a) a high activity (25 curies of ^{3}H and ^{14}C) Class A solidified resin waste generated by an industrial research and development facility and (b) still bottoms and filters from a decontamination unit using freon at an industrial research and development facility. It was assumed that even if steam reforming was available, the limits on radioactivity would likely exclude this waste stream. It was assumed that F001 and F002 liquid waste would be managed by DSSI without generation of listed waste residue, and low activity solid wastes would be managed using steam reforming. Steam reforming waste will result in a listed waste residue that would require jointly regulated disposal, if not delisted.

Similarly, for **F003 wastes** generated in 1990, only 0.43 cubic meters will likely not be treatable. This F003 untreatable waste has 1.98 curies of ^{60}Co, ^{58}Co, and ^{54}Mn in acetone and results from the in-core cleaning of instrumentation. The other 0.37 cubic meters consists of 100 millicuries of ^{14}C. An additional 0.72 cubic meters of stored acetone waste having 4.6 curies of similar radionuclides is also identified as untreatable. While steam reforming or DSSI should be able to treat the F003 component of the waste, the radioactivity exceeds DSSI's current license and is likely to exceed the limits for the steam reformer, when established. Because F003 wastes are listed solely for the characteristic of ignitability, treatment residues that do not exhibit the characteristic of ignitability do not need to be managed as F003 listed waste. Therefore, no other F003 treated waste meeting the treatment requirements of 40 CFR 268 should require management in a jointly regulated land disposal facility.

The only untreatable **F005 waste** generated in 1990 is described as 46 curies and 3.5 cubic meters of ^{3}H, ^{14}C, and ^{125}I waste in xylene and toluene liquid waste generated from research by an industrial research and development facility. No F005 wastes in storage were identified as untreatable. In spite of available treatment for the hazardous component of the waste, the radioactive component exceeds all existing and expected license limits for commercially available treatment, thus precluding treatment of this high activity mixed waste. Treatment residues from F005 steam reforming waste will require disposal as mixed waste unless delisted. Listed residues from generated wastes are estimated to be approximately 14.7 cubic meters, conservatively assuming no volume reduction for absorbed liquids, other solid waste, and trash.

Only one of the generated **P- and U-listed wastes** was identified as being untreatable by available commercial means: P030 and F005 in 2.095 cubic meters and 0.415 millicuries of ^{14}C in uncompacted trash, generated by a research and development industrial firm. This waste is also identified as an untreatable stored waste. The hazardous components are described as toluene and granite salts (a reactive waste). Most of the other liquid P- and U-listed waste was assumed to be treatable by DSSI, with or without blending with high Btu-content wastes. Steam reforming or other similar treatment will be needed for the absorbed liquids, ion exchange resins, solids, and trash waste forms. Wastes treatable through DSSI are assumed to have no RCRA-regulated listed residues; however, those from steam reforming will need to be managed as a listed waste. Conservatively assuming no volume reduction from the steam reforming process, approximately 8.4 cubic meters will require subsequent management as a listed waste residue under the existing derived-from rule.

Leaking sealed sources containing beryllium were identified as a P015 listed waste for both generated and stored wastes. Sealed sources containing beryllium are not considered to be a mixed waste because the beryllium is not a discarded commercial chemical product or a sole active

ingredient. A separate report on waste designation of similar sealed sources has been published by DOE (U.S. Department of Energy, 1994).

None of the generated or stored **oil wastes** were identified as being untreatable. Some may require blending with high Btu waste or treatment by steam reforming, but all are considered treatable without subsequent management of treatment residues as mixed waste.

Through blending, steam reforming, and existing treatments, all but 1.69 cubic meters and 208 millicuries of the **LSC wastes** are considered to be treatable using commercially available vendors, although 47.5 mCi of ^{32}P and ^{35}S may be stored for decay. As previously mentioned, one of these waste streams was categorized as being a Class C generated and stored waste; however, there is reason to believe that the designation is incorrect as LSC techniques do not work for high concentrations of radioactivity and the reported concentration is below the Class C limit. All but 1.39 cubic meters of the absorbed liquids were assumed to be treatable using steam reforming, and subsequent management of treatment residues of F005 absorbed liquid wastes will require management as a listed waste. These treatment residues are estimated to be approximately 42.55 cubic meters for those generated LSC wastes identified as solids or absorbed liquids. The activity limits on the waste input to the SEG steam reforming process as described in Section 4.3 limit the ability of this process to treat 0.07 percent of the volume and 1.3 percent of the activity of the generated LSC wastes.

Of the generated wastes having **multiple waste codes**, five wastes that were reactive and one high-activity waste were identified as untreatable. These untreatable wastes comprise 77.8 cubic meters with 94% of that waste originating from a single Federal government research and development facility in the form of laboratory trash from research. Of the stored wastes having multiple waste codes, six were identified as untreatable: four were reactive, one had high activity, and one was both reactive and a high-activity waste. Treatment from DSSI and steam reforming is assumed for the other wastes. Conservatively assuming no volume reduction of solids from steam reforming results in an estimated additional 0.52 cubic meter requiring management as a listed, derived-from waste.

It is impossible to make definitive treatment assumptions regarding the 38 cubic meters of **miscellaneous generated waste** and 76 cubic meters of miscellaneous stored waste due to incomplete characterization information on this group of waste. However, at least one of these stored waste streams has such high activity as to be untreatable by all existing and expected methods. This waste is identified as 275 curies of ^{14}C contaminated hazardous waste bulk liquid from an industrial manufacturer.

The following tables summarize the results of this analysis. Table 5-1 lists the waste streams generated in 1990 with no treatment option available. Table 5-2 provides volume summaries of these untreatable generated wastes categorized by hazardous constituent group and physical form. Table 5-3 details activity in millicuries of these untreatable generated wastes. Tables 5-4 through 5-6 list similar information for waste streams in storage as of December 31, 1990, with no treatment option available.

Untreatable wastes constitute a very small percentage of generated and stored mixed waste volumes. However, because of the limitations imposed by radioactive materials licenses for existing and expected treatment facilities, untreatable mixed wastes represent a significant proportion of the activity of all mixed waste. Interviews with providers of commercially available treatment facilities indicate that aside from economics, the next most limiting factor in providing

Table 5-1. Untreatable wastes generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Reactive Waste									
Academic 10,000-20,000 Students -- No EPA Classification	Lead- Containing Waste - Organic liquids	Research -- Staining procedure	Liquid	Osmium tetraoxide	0.019	D003	U-238	A	0.000
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 Kg/month)	Other -- Metal fines	Cleaning / grinding of magnesium - 2% thorium metal castings	Solid	Metal Cleaning Solutions	9.309	D003	Th-232	A	7.100
Industrial	Other (Mg-Th alloy)	Unknown	Unknown	Mg, Th	3.444	Unknown	Unknown	—	Unknown
Academic 10,000-20,000 Students -- Large quantity generator (>1000 Kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	Potassium cyanide	0.004	D003	S-35	A	0.500
Academic 10,000-20,000 Students -- Large quantity generator (>1000 Kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	Sodium cyanide	0.004	D003	C-136	A	0.500
Industrial -- Research & Development -- Large quantity generator (>1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Surplus reagent chemicals and by-products used in chemistry lab setting "lab packs"	Solid Uncompacted	Thorium Nitrate	0.372	D003	Th-232	A	0.102
Metals									
Medical (Non-Federal) -- Hospital 250-750 beds -- Small quantity generator (100-1,000 Kg/month)	Lead-Containing Waste: Shielding	Retired brachytherapy sources in shielded casks. Lead shielding	Solid	Lead	0.233	D008	Cs-137	B	1,180.300
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 Kg/month)	Mercury-Containing Waste	Tracer Preservative	Solid	Mercury	0.774	D009	I-125, Co-57	A	75.760

Table 5-1. Untreatable wastes generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 Kg/month)	Mercury-Containing Waste (Solids)	Glass - contaminated	Solid	Mercury	0.070	D009	Th-232	A	0.240
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 Kg/month)	Mercury-Containing Waste: Elemental mercury	Lab analytical process and maintenance	Solid	Mercury	7.387	D003	U-235, U-238	A	255.600
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 Kg/month)	Irradiated Reactor or Pool Components	Spent reactor control rods	Uncompacted solid	Cadmium	0.034	D006	Cd-109, Ag-109m, Cd-113m, Fe-55, Co-60	B	84,000.000
F001 & F002									
Industrial -- Research & Development	Ion Exchange Resins -- Solidified	Waste from research	Aqueous	Org-Cl	2.814	F001	H-3, C-14	A	25,000.000
F003									
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity reactor (>1000 Kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Cleaning Incore Instrumentation	Aqueous	Acetone	0.058	F003	Co-60, Co-58, Mn-54	A	1,982.000
F005									
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Liquid	Xylene, Toluene	3.518	F003, F005	H-3, C-14, I-125	A	46,000.000

Table 5-1. Untreatable wastes generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
P & U									
Industrial -- Research & Development -- Small quantity generator (100-1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Contaminated lab trash (gloves, pipet tips, bench paper, etc.) produced during DNA labelling experiments. Biochemistry protein assays.	Uncompacted Solid	Toluene, Granite Salts	2.095	F005, P030	C-14	A	0.415
LSC									
Academic <10,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Small scale biological experiment for teaching	Scintillation fluid	Toluene, Dioxane	0.150	F005, D001	H-3, C-14	C	12.450
Academic <10,000 students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Small scale biological experiment for teaching	Scintillation Fluid	Toluene	0.150	F005	P-32, S-35	C	47.500
Multi-Code									
Government -- Federal (Research & Development) -- Large quantity generator (>1000 Kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratory research	Uncompacted solid	Unknown	73.281	D001, D002, D003, F002, F003, F005, U003, U022, U168, U089, U221	H-3, C-14, S-35, P-32, I-125	A	1.300
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 Kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Maintenance activities	Solvent liquid	Ignitable, mercury, barium, lead, chromium, chloroform, 1,1-dichloroethylene, tetrachloroethylene, dichloroethane, cadmium, methyl ethyl ketone	0.726	D001, D003, D009, D008, D005, D007, D022, D029, D039, D040, D028, D006, D035	Ni-63, Fe-59, Co-58, Fe-55, Mn-54, Sr-90, Nb-95, Tc-99, Cs-134, Sr-89, Cr-144	A	0.000

Table 5-1. Untreatable wastes generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- Large quantity generator (>1000 Kg/month)	Liquids Aqueous -- Absorbed (Long T1/2 - H-3, C-14, S-35 radioactive liquid)	From research and teaching laboratories	Liquid	Acetone, phenol, acetic acid, TCA, sulfuric acid, chloroform, carbon tetrachloride	2.841	F003, D002, D003, D022, F001, F002	H-3, C-14, P-32, S-35, I-125, Sr-90	A	13.330
Academic <10,000 Students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Bulk liquid	Methanol, acetic acid	0.042	F003, D003	Se-75	A	0.010
Industrial -- Manufacturing (>200 employees) -- Conditionally exempt small quantity generator (<100 Kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Expired product	Liquid	Corrosivity, reactivity, EP toxicity	0.791	D002, D003, D004-32	H-3, C-14	A	0.000
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 Kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from manufacture of labeled compounds	Liquid	Organochlorides (methanol, ethyl acetate, xylene, n-hexane, acetone, acetonitrile, ethyl ether, butanol, toluene, benzene, pyridine, methyl ethyl ketone, pentane, acetic acid, tetrahydrofuran, acrylonitrile, cyclohexane	0.152	F003, D001, D018, D038, D035, D002	C-14	A	12,397.900
Academic >20,000 students -- Large quantity generator (>1000 Kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Biomedical Research laboratory	Compacted solid	Acetonotrile, chloroform, methanol	1.452	D001, D022	H-3, C-14, S-35	A	30.000
Industrial -- Research & Development	Filters, Mechanical	Filters from Freon decon machine	Solid	Still Bottoms	7.096	F002	Co-60, Mn-54, Fe-55	A	62.400
Industrial -- Research & Development	Liquid Organic - (Solvents, Chlorinated Solvents, etc.)	Laboratory research	Absorbed Liquid	Ethyl Acetate	0.186	F003	C-14	A	40.000

Table 5-1. Untreatable wastes generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development	Other biological waste (Non-infectious)	Laboratory research - cell labeling. From cleanup procedure	Absorbed Liquid	Ethyl Acetate	0.093	F003	C-14	A	30.000
Industrial -- Research & Development	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratory research. From cleanup procedure	Absorbed Liquid	Ethyl Acetate	0.093	F003	C-14	A	30.000
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 Kg/month)	Liquids Aqueous -- Absorbed	Aqueous waste disposal method	Absorbed Liquid	Counting Fluid	0.141	Unknown	C-14	A	9.100
Industrial (not for profit toxicological research institute) -- Conditionally exempt small quantity generator (<100 Kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Absorbed liquid	Hydrocarbon Solvent	0.352	D001	H-3, C-14	--	83.100
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory research - counting procedures	Absorbed Liquid	Unknown	0.372	F003, F005	C-14	A	50.000
Industrial -- Research and Development -- Small quantity generator (100-1000 Kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biotechnology R&D, 14C and 3H	Absorbed liquid	Xylene	0.528	F003	C-14 , H-3	A	5.700
					118.583				**171,315.307**

Table 5-2. Summary of generated waste volumes that are not treatable by hazardous constituent group and physical form.

Waste	*Weighted Volume in cubic meters before treatment*						***Total Untreatable Volume***	***Percent Untreatable Volume***
	Aqueous	*Liquid, n.o.s.*	*Absorbed Liquid*	*Solid, n.o.s.*	*Trash*	*Unknown a/*		
Ignitable							0.00	0.00
Corrosive							0.00	0.00
Biological							0.00	0.00
Reactive		0.02		12.75	0.38		13.15	11.09
Characteristic metals				8.50			8.50	7.17
Characteristic organics					1.45		1.45	1.22
F001 & F002	2.81			7.10			9.91	8.36
F003	0.06		0.37				0.43	0.36
F005		3.52					3.52	2.97
P & U listed					2.09		2.09	1.77
Oils							0.00	0.00
Other organics							0.00	0.00
LSC		0.30	1.39				1.69	1.43
Multi-code waste		4.55			73.28		77.83	65.64
Miscellaneous							0.00	0.00
TOTAL VOLUME	2.87	8.39	1.76	28.35	77.21	0.00	118.58	
Percentage of total original volume that is untreatable b/	0.08	0.24	0.05	0.81	2.21			

a/ The volumes of generated wastes for which the physical forms are not known are 368 cubic meters. This volume has not been included in the total volume and percent volume calculations.
b/ The original volume used is 3,496 cubic meters from Table 3-1.
n.o.s. = not otherwise specified.

Table 5-3. Summary of generated waste activity that is not treatable by hazardous constituent group and physical form.

Waste	*Activity in mCi before treatment*						***Total Untreatable Activity***	***Percent Untreatable Activity***
	Aqueous	*Liquid, n.o.s.*	*Absorbed liquid*	*Solid, n.o.s.*	*Trash*	*Unknown a/*		
Ignitable							0.00	0.00
Corrosive							0.00	0.00
Biological							0.00	0.00
Reactive		0.00		7.10	1.10		8.20	0.00
Characteristic metals				85,511.90			85,511.90	49.91
Characteristic organics					30.00		30.00	0.02
F001 & F002	25,000.00			62.40			25,062.40	14.63
F003	1,982.00		100.00				2,082.00	1.22
F005		46,000.00					46,000.00	26.85
P & U listed					0.42		0.42	0.00
Oils							0.00	0.00
Other organics							0.00	0.00
LSC		59.95	147.90				207.85	0.12
Multi-code waste		12,411.24			1.30		12,412.54	7.25
Miscellaneous							0.00	0.00
TOTAL ACTIVITY	26,982.00	58,471.19	247.90	85,581.40	32.82	0.00	171,315.31	
Percentage of total original activity that is untreatable b/	10.46	22.67	0.10	33.18	0.01			

a/ The activity of generated wastes for which the physical forms are not known are 310 mCi. This activity has not been included in the total activity and percent activity calculations.
b/ The original activity used is 257,911 mCi from Table 3-2.
n.o.s. = not otherwise specified.

Table 5-4. Untreatable waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Reactive									
Academic 10,000-20,000 Students -- No EPA Classification	Lead- Containing Waste	Accumulation for offsite treatment	Liquid	Osmium tetroxide	0.019	D003	U-238	A	0.000
Academic >20,000 Students -- Small quantity generator (100-1,000 Kg/month)	Liquids Aqueous - Solidified	Electron microscopy	Solid	Uranyl nitrate, thorium nitrate	0.038	D003	U-238, Th-232	—	0.080
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 Kg/month)	Other -- Metal fines	Casting/cleaning. Storage for generator treatment on-site	Solid	Reactivity III (2)	9.309	D003	Th-232	A	7.100
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 Kg/month)	Mercury-Containing Waste: Elemental mercury	Permanent on-site storage, no treatment or disposal facility	Solid	Mercury	64.143	D003	U-235, U-238	A	255.600
Academic 10,000-20,000 Students -- Large quantity generator (>1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	Potassium cyanide	0.004	D003	C-14	A	0.001
Academic 10,000-20,000 Students -- Large quantity generator (>1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research. Unable to treat/ship	Solid	Sodium cyanide	0.004	D003	C-14	A	0.001
Metals									
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 Kg/month)	Other (Specify) -- Chromium Waste - Flammable	Uranium recovery dissolution. Permanent on-site storage, no treatment or disposal facility	Solid	Chromium	29.020	D007	U-235, U-238	A	3,272.600
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Neutron shield process chemical	Solid	Chromated trash	0.218	D007	H-3, Mn-54, Fe-55, Co-58, Ni-63, Zn-65, Cs-134, Cs-137, Co-60	A	0.000

Table 5-4. Untreatable waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Government -- Federal (Military) -- Large quantity generator (>1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Maintenance and repair of U.S. Navy ships, no mixed waste treatment or disposal	Solid	Chromate	2.834	D007	Co-60	A	0.000
Government -- Federal (Research & Development) -- Small quantity generator (100-1,000 Kg/month)	Irradiated Reactor or Pool Components	Spent reactor control rods (cadmium); permanent on site storage	Uncompacted solid	Cadmium	0.034	D006	Cd-109, Ag-109m, Cd-113m, Fe-55, Co-60	B	84,000.000
F003									
Academic >20,000 Students -- Large quantity generator (>1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Lab Research/Biomedical. On site storage for decay and permanent on-site storage (indefinite)	Compacted solid	Acetonitrile, methanol, phenol, chloroform	0.573	D001, F003	H-3, C-14, P-32, S-35, I-125, Na-22, Ce-141	A	25.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity reactor (>1,000 Kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Accumulation for future treatment/ shipment	Aqueous	Acetone	0.145	F003	Co-58, Co-60, Mn-54	A	4,624.000
P & U									
Academic <10,000 Students -- No EPA Classification	Other - (specify) - Solid Beryllium	Cf252, Np237, Am241, Ra226 open sources for which we were seeking disposal	Solid	Beryllium	0.484	P015	Pu-239	A	6,000.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Page cells. Stored for accumulation prior to shipment - Decay	Solid	Acrylamide, sodium azide	0.047	U007, P105	S-35, I-125	A	5.000

Table 5-4. Untreatable waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
LSC									
Industrial -- Research & Development	Liquids Scintillation, containing radio-isotopes other than C-14 and/or tritium -- (fluids or vials)	Awaiting shipment for disposal	Solid	Alkylbenzene	0.019	F005	C-14	A	12.100
Multi-Code									
Academic <10,000 Students -- No EPA Classification	Lead Containing Waste -- Aqueous Liquids	Staining procedures	Liquid	Osmium, lead	0.019	P087, D008	U-238	A	0.000
Academic <10,000 Students -- Small quantity generator (100-1,000 Kg/month)	Liquids Organic - (Solvents, Chlorinated Solvents, etc.)	Unable to dispose of waste due to organic contents	Absorbed liquid	Methanol, benzene, chloroform	0.084	D022, F003	H-3, C-14, Ni-63	A	3,175.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1,000 Kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Mixed waste interim status TSDF awaiting treatment and/or disposal technology	Solvent liquid	Ignitable, reactivity, mercury, barium, lead, chromium, chloroform, 1,1-dichloro-ethylene, tetrachlo-roethylene, dichloroethane, cadmium, methyl ethyl ketone	3.487	D001, D003, D009, D008, D005, D007, D022, D029, D039, D040, D028, D006, D035	Co-60, Cs-137, Ni-63, Ni-59, Fe-59, Co-58, Fe-55, Mn-54, Sr-90, Nb-95, Tc-99, Cs-134, Sr-89, Pm-147	A	0.000
Industrial -- Manufacturing (>200 employees) -- Conditionally exempt small quantity generator (<100 Kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage on-site for decay/storage for accumulation. Unable to dispose. Expired	Liquid	Corrosivity, Reactivity, EP toxic	3.430	D002, D003, D004-32	H-3, C-14	A	43,000.000
Government -- Federal (Research & Development) -- Large quantity generator (>1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Decay, incineration, accumulation for lower cost	Solid	Unknown	1.499	D001, D002, D003, F001, F003, F005, U022, U168	H-3, C-14, I-125, S-35	A	3.500

Table 5-4. Untreatable waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research and Development -- Small quantity generator (100-1,000 Kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Biochemistry protein assays. Storage of P-32 contaminated lab trash for decay. Having difficulty disposing of the waste	Uncompacted Solid	Toluene, Granite Salt	2.095	F005 P030	C-14	A	0.415
Misc									
Industrial -- Manufacturing (<50 employees on site) -- Large quantity generator (>1,000 Kg/month)	Other -- (Specify)	On-site storage for accumulation - For shipment or treatment	Bulk Liquid	Hazardous Waste Liquid	5.204	Unknown	C-14	—	275,000.00
Industrial -- Research & Development -- Small quantity generator (100-1,000 Kg/month)	Solidified Evaporator Bottoms/Concentrates/ Sump Sludge	Storage for accumulation - for future shipment	Liquid	Pesticides	0.002	Unknown	C-14	A	3,000.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 Kg/month)	Liquids Aqueous -- Solidified	From biochemical and environmental fate studies. Storage for accumulation - for future shipment	Liquid/ Solidified	Pesticides	0.186	Unknown	C-14	A	100.000
					122.895				422,480.397

Table 5-5. Summary of stored waste volumes that are not treatable by hazardous constituent group and physical form.

Waste	*Weighted volume in cubic meters before treatment*						***Total Untreatable Volume***	***Percent Untreatable Volume***
	Aqueous	*Liquid, n.o.s.*	*Absorbed Liquid*	*Solid, n.o.s.*	*Trash*	*Unknown a/*		
Ignitable							0.00	0.00
Corrosive							0.00	0.00
Biological							0.00	0.00
Reactive		0.02		73.49	0.01		73.52	59.82
Characteristic Metals				32.11			32.11	26.12
Characteristic Organics							0.00	0.00
F001 & F002							0.00	0.00
F003	0.15				0.57		0.72	0.58
F005							0.00	0.00
P & U Listed				0.48	0.05		0.53	0.43
Oils							0.00	0.00
Other Organics							0.00	0.00
LSC				0.02			0.02	0.02
Multi-Code Waste	0.02	6.92	0.08		3.59		10.61	8.64
Miscellaneous		5.21	0.19				5.39	4.39
TOTAL VOLUME	0.16	12.14	0.27	106.10	4.22	0.00	122.90	
Percentage of original volume that is untreatable b/	0.01	0.90	0.02	7.88	0.31			

a/ The volumes of stored wastes for which the physical forms are not known are 8 cubic meters. This volume has not been included in the total volume and percent volume calculations.
b/ The original volume used is 1,346 cubic meters from Table 3-3.
n.o.s. = not otherwise specified

Table 5-6. Summary of stored waste activity that is not treatable by hazardous constituent group and physical form.

Waste	*Activity in mCi before treatment*						***Total Untreatable Activity***	***Percent Untreatable Activity***
	Aqueous	*Liquid, n.o.s.*	*Absorbed Liquid*	*Solid, n.o.s.*	*Trash*	*Unknown a/*		
Ignitable							0.00	0.00
Corrosive							0.00	0.00
Biological							0.00	0.00
Reactive		0.00		262.78			262.78	0.06
Characteristic Metals				87,272.60			87,272.60	20.66
Characteristic Organics							0.00	0.00
F001 & F002							0.00	0.00
F003	4,624.00				25.00		4,649.00	1.10
F005							0.00	0.00
P & U Listed				6,000.00	5.00		6,005.00	1.42
Oils							0.00	0.00
Other Organics							0.00	0.00
LSC				12.10			12.10	0.00
Multi-Code Waste	0.00	43,000.00	3,175.00		3.92		46,178.92	10.93
Miscellaneous		278,000.00	100.00				278,100.00	65.83
TOTAL ACTIVITY	4,624.00	321,000.00	3,275.00	93,547.48	33.92	0.00	422,480.40	
Percentage of original activity that is untreatable b/	1.06	73.57	0.75	21.44	0.01			

a/ The activity of stored wastes for which the physical forms are not known are 15 mCi. This activity has not been included in the total activity and percent activity calculations.
b/ The original activity used is 436,345 mCi from Table 3-4.
n.o.s. = not otherwise specified

treatment for mixed waste is air emissions, especially for ^{14}C and ^{3}H. With their proximity to off-site populations, most commercial treatment facilities are technologically unable to manage larger quantities of ^{14}C and ^{3}H without generating even larger volumes of secondary mixed waste.

6. SUMMARY OF WASTE MANAGEMENT OPTIONS

Most, but not all, mixed waste can be treated by commercially available technology. Of the 3,496 cubic meters of mixed waste generated in 1990, all but 118 (3.4%) can be treated. Table 6-1 summarizes the available treatment. This estimate is considerably lower than the 336 cubic meter value estimated in the National Profile. The main reasons for these differences are the advent of new technologies and management techniques (steam reforming and blending of low-activity, high-Btu content waste) and use of a different methodology for sorting and evaluating combinations of waste code and physical form. Table 3-1 summarizes the wastes that were generated in 1990. Of those wastes, the untreatable wastes are identified and summarized in Tables 5-1 and 5-2, respectively. In addition to untreatable wastes, treatment residues of listed wastes are required to be managed as listed waste under the derived-from rule currently in effect. These derived-from wastes, estimated as 1% of 1990 stored and generated listed waste, constitute an additional 6.26 cubic meters.

In order for the currently untreatable wastes to be land disposed, one or more of the following regulatory options must be successfully pursued:

- Treatability variance
- Finding of equivalent treatment
- No migration petition.

If none of these regulatory options is available and the waste remains untreated, the waste will be banned from land disposal.

In addition to untreated and derived-from wastes, approximately 38 cubic meters of the generated mixed waste has been insufficiently characterized to enable an estimate of waste treatment. Depending on the eventual characterization of these wastes, additional untreatable or derived-from wastes can be expected. Because of the uncertainties associated with this waste, it is conservatively estimated that no more than 4 cubic meters (10%) of this waste will be untreatable.

In summary, commercially generated waste volumes that may require land disposal in a jointly regulated mixed waste disposal facility each year have the following components:

Waste Type	Estimated Volume (cubic meter/year)
Currently untreatable waste (Acceptable for disposal only after regulatory option is successful)	118
Waste residues derived from listed waste (estimated)	6
Contribution from poorly characterized waste (estimated)	4
TOTAL	128

It should be remembered that an additional 123 cubic meters of mixed waste was in storage in 1990.

Several regulatory options could potentially be used to eliminate the need to dispose of mixed waste in jointly regulated facilities, or to reduce the cost of treatment or disposal. With a delisting petition, generators may petition EPA to exclude a waste from regulation under RCRA. Where the petition is successful, the wastes can be disposed of as nonhazardous waste, outside the RCRA jurisdiction. In the case of mixed waste, such disposal could be in a low-level radioactive waste disposal facility regulated solely under the AEA, with state and facility approval. Discussions with EPA officials, however, indicate that petition approvals are difficult to obtain. Economic evaluations indicate that delisting is practical only if applied to large volumes of waste, typical of those at treatment facilities.

With regard to no migration variances, EPA staff have indicated that facilities meeting NRC and RCRA design requirements may meet no migration standards, and that storage in such units would not be subject to the one-year storage standard. EPA staff emphasized the difficulty in obtaining the variance, as only 1 of 31 petitions has been granted. In addition, waste disposed of in such facilities would still be required to meet 10 CFR 61 waste form requirements before disposal. The usefulness of this approach has diminished with the issuance of EPA policy allowing storage of greater than one year for generators of small amounts of mixed waste.

Variances for alternative treatment standards are also difficult to obtain. Of 25 petitions received by EPA, three have been granted. Estimated costs for preparation are $40,000. Treatability variances, however, are intended to address technological problems associated with meeting treatment standards for unconventional wastes.

Determination of Equivalent Treatment Petitions may be a more viable alternative than treatability variances. According to EPA personnel, they are more common than treatability variance petitions, and more likely to be granted by the agency. High-activity wastes may be candidates for either the treatability variance or the Equivalent Treatment Petition because the radioactivity becomes a dominant technological consideration in management of these wastes.

Untreatable wastes constitute a very small percentage of generated and stored mixed waste volumes. However, because of the limitations imposed by radioactive materials licenses for existing and expected treatment facilities, untreatable mixed wastes represent a significant proportion of the activity of all mixed waste.

Table 6-1. Summary of available treatment alternatives.

Treatment Alternatives	Processes Available	Radioactive Material License	RCRA Part B Permit
Diversified Scientific Services, Inc. Kingston, Tennessee	Solvent Processing	Yes	Yes
	Combustion	Yes	Yes
Envirocare of Utah Salt Lake City, Utah	Land Disposal	Yes	Yes
	Stabilization	Yes	Yes
	Size Reduction	Yes	Yes
	Chemical Oxidation	Yes	Yes
	Chemical Reduction	Yes	Yes
	Neutralization	Yes	Yes
	Macroencapsulation	Yes	No
Perma-Fix of Florida Gainesville, Florida	Liquid Scintillation Vial Processing	Yes	Yes
	Combustion	Yes	Yes
NSSI/Recovery Services Houston, Texas	Fuel Blending	Yes	Yes
	Stabilization	Yes	Yes
	Size Reduction	Yes	Yes
	Chemical Oxidation	Yes	Yes
	Chemical Reduction	Yes	Yes
	Neutralization	Yes	Yes
	Filtration/Separation	Yes	Yes
	Waste Consolidation	Yes	Yes
	Absorption	Yes	Yes
	Solvent Recycling	Yes	Yes
Scientific Ecology Group Oak Ridge, Tennessee	Incineration	Yes	No
	Steam Reforming	Yes	No

7. REFERENCES

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Appendices A-1 through A-15

Wastes Generated in 1990

Table A-1. Ignitable waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumu-lative Activity (mCi)
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Aqueous -- Absorbed	Waste from research activities	Liquid Absorbed		0.281	D001	In-111, I-125	A	0.000
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Research sample prep - absorbents spent reagents (contains C-14)	Absbd liquid/solid	Formaldehyde	0.076	D001	C-14	A	0.2
Industrial -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Generated by analytical practices	Aqueous	Organics	0.306	D001			
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Formaldehyde	0.021	D001			
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Methanol	0.042	D001			
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Ethanol	0.063	D001	H-3, C-14, P-32, S-35	A	1
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Extraction solvents from labs	Bulk	Various alcohols	0.057	D001	H-3, C-14, P-32	A	0.1
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory counting procedures, waste from research	Bulk Liquid	TNT	0.316	D001	C-14	A	0.006
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory counting procedures, waste from research	Bulk Liquid	TNT	0.316	D001	C-14	A	0.006
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Abandoned Decommissioned Parts Washer	Bulk liquid	Waste flammable liquid N.O.S.	0.203	D001	Co-60, Co-58, Cs 134, Cs-137, Mn 54		0.002
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Cleaning solvent	Bulk liquid	Petroleum distillate	0.073	D001			

Table A-1. Ignitable waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumu-lative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint solvent/waste	Bulk liquid	Flammable solvents	1.017	D001	Co-60, Cs-137		1.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint/solvent waste	Bulk liquid	Flammable solvents	13.802	D001	Co-60, Mn-54		780.030
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Lab research. Liquid organic deregulated	Bulk Liquid	Ignitability	0.372	D001	H-3, C-14	A	215.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory counting procedures	Bulk Liquid	Tetrahydrofuran	0.698	D001	H-3	A	0.007
Medical (Non-Federal) -- Medical College/Hospital -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research waste	Bulk Liquid	Ignitable	0.078	D001	S-35, P-32	A	5.000
Industrial -- Research and Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Spent reagents	Bulk Liquid	Flammable Liquid	0.035	D001	C-14	A	3.000
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Used for laboratory counting procedures	Bulk liquid	Petroleum distillates	0.168	D001	H-3	A	0.011
Medical (non-Federal) -- Research -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from biomedical research	Bulk liquid	Ignitable	0.631	D001	H-3, C-14, P-32, S-35, I-125	A	358.4
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research and service contract	Bulk Liquid	Formamide	0.034	D001	P-32	A	0.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research and service contract	Bulk Liquid	Formamide	0.071	D001	S-35	A	0.000

Table A-1. Ignitable waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumu-lative Activity (mCi)
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Laboratory Counting Procedure	Bulk liquid	Acetonitrile	0.076	D001	I-125	A	10
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint solvent waste	Bulk Liquid	Flammable Solvents	1.613	D001	Co-60, Cs-134, Cs-137		0.001
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Short lived liquid form stored for decay (bottles in drums - Laboratory Waste)	Research laboratories	Bulk liquid	Ethanol	0.011	D001			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Paint waste, degreasing	Liquid	Isopropanol, acetone, methyl ethyl ketone	0.596	D001	Mn-54, Co-60	A	2.759
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Research	Liquid	Ethanol	0.038	D001	H-3, C-14	A	20
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Biomedical research	Liquid	Flammable liquids	32.977	D001			
Academic 10,000-20,000 Students - No EPA Classification	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Animal colony wastes	Liquid	Organic solvent	0.042	D001	H-3, S-35, P-32	A	5
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	HPLC waste	Liquid	Acetonitrile	0.281	D001	H-3, C-14, S-35	A	11
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory experiments	Liquid	Acetonitrile	1.489	D001			
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Liquid waste from equipment clean-up and radiotracer tests	Liquid	Various Alcohol	0.372	D001	C-14	A	100.000

Table A-1. Ignitable waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumu-lative Activity (mCi)
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research -- Superfund soil remediation	Liquid	Coal Tars, naphthalene	0.191	D001	C-14, H-3	A	0.5
Academic <10,000 Students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Liquid	CIS-2-pentene	0.019	D001	Na-22	A	1
Medical (Non-Federal) -- Hospital >750 beds -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Research	Liquid	Characteristic Hazard	11.401	D001	C-14, P-32, I-125		0.000
Medical (Non-Federal) -- Research -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Ethanol extractions from research	Organic Liquid	Ignitable	0.004	D001	P-32	A	0.200
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Miscellaneous solvents, laundry still bottoms, solvent soaked rags	Solid	Ignitable solvent rags	0.218	D001	Cs-137, Cs-134, Co-60, Mn-54, Co-58, Fe-55	A	0.050
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Paint	Paint waste	Solid	Paint waste	0.023	D001	Co-60	A	0
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint: Oil-based	Painting activities, excess / out of spec..	Solid / liquid	Ignitable liquid	0.029	D001	Co-60, Cs-134, Cs-137		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Adhesives	Miscellaneous maintenance activities	Solid / semi-solid	Ignitable adhesives	0.218		Co-60, Fe-55, Cs 134, Cs-137, Mn 54, Co-58	A	0.005
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Waste from research, cleaning of laboratory equipment	Uncompacted solid	TNT	0.421	D001	C-14	A	0.005

Table A-2. Corrosive waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Aqueous -- Solidified -- Noah solution	Plant maintenance	Aqueous	NA OH solution	0.872	D002	Co-60, Co-58, Fe 55	A	0.680
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Parkerizing fluid	Corrosion treatment for reactor vessel studs	Aqueous	Parkerizing solution	0.872	D002	Co-60, Co-58, Fe 55	A	0.680
Medical (Non-Federal) -- Research -- Large quantity generator (>1,000 kg/month)	Other -- (Specify)	Inorganic acid solutions from research	Aqueous Liquid	Corrosive	0.019	D002	H-3, P-32, I-125	A	13.000
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Waste from research activities	Bulk Liquid	Corrosive	0.038	D002	H3, C14	A	5
Industrial -- Decontamination facility & waste reduction	Liquids Aqueous -- Absorbed		Bulk Liquid	Acid	0.046	D002		A	0.000
Academic >20,000 students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research waste	Bulk liquid	PO-58 P115 acids	0.084	D002	Uranium and thorium	A	0
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Corrosive liquids	Maintenance activities	Bulk liquid	Corrosive liquid	0.218	D002	H-3	A	0.208
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Acids	Research	Liquid	Acetic acid	0.287	D002	I-125	A	0.024
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Research	Liquid	Phosphoric acid	0.115	D002	P-32	A	25
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Research	Liquid	Sulfuric acid	0.076	D002	S-35	A	45
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Biomedical research	Liquid	Acids	32.977	D002			

Table A-2. Corrosive waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Other (Specify) -- Phosphoric Acid (Corrosive)	Electropolisher	Liquid	Phosphoric acid	1.308	D002	Co-60, Cs-137, Mn-54	A	0.000
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Other - (specify)	Lab paraphernalia from research studies for decay. Concentrated contaminated acids	Liquid	Corrosive	0.052	D002	H-3, C-14	A	0.475
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Other - (specify) - Liquids aqueous	Discarded radiochemicals used in research	Liquid - small vials	Various	0.021	D002	H-3, C-14	A	15
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Other - (Specify)	Electropolisher filters.	Solid	Electropolisher filters	0.654	D002	Co-60, Cs-137, Fe-55, Zn-65		4.500
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	HCL	0.038	D002	P-32	A	6
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	Phos acid	0.038	D002	C-14	A	0.001
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	Sulfuric acid	0.038	D002	C-14	A	0.001
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratory waste (gloves, paperliners, etc.) from chromatograph gels	Solid	Phenol	1.263	D002	H-3, P-32, I-125, S-35	A	50
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Filter Media -- Dewatered	Uranium Recovery waste	Uncompacted Solid	Corrosive D002	39.572				
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Filters, Mechanical	Electropolisher Filter	Uncompacted solids	Acid filters	0.494	D002	Co-60, Cs-137, Mn-54	A	0.000

Table A-3. Biological waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Biological Waste (Non-infectious)	S35	Absorbed	Deoxyadenosine 5' - (A-thio) triphosphate	0.057				
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Biological Waste (Non-infectious)	Spent reagents - lab counting procedures (contains I-125)	Absorbed	Tyrosine	0.191	D001	I-125	A	0.002
Industrial -- Sealed Source/Gauge/Instrument User	Other Biological waste (Non-infectious)	Excrete from research animals	Bulk Liquid	Urine and Feces	1.396		C-14, H-3		50.000
Medical (Non-Federal) -- Research -- Large quantity generator (>1,000 kg/month)	Animal Carcasses containing C-14 and/or tritium (Non-infectious)	Lab animals used for research	Solid	Animal Carcasses	0.233		H-3, C-14, Ca-45	A	26.440
Medical (Non-Federal) -- Research -- Large quantity generator (>1,000 kg/month)	Animal Carcasses containing radioisotopes other than C-14 or tritium (Non-infectious)	Lab animals used for research	Solid	Animal Carcasses	0.078				
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Biological Waste (Non-infectious)	Lab research and instruction	Solid	Biological waste	0.034		H-3, C-14	A	0
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Biological Waste (Non-infectious)	Waste from research activities	Solid	Biological Waste	1.055	D001	In-111	A	0.000
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Other biological waste	Cell cultures	Uncompacted solid	Biological waste	0.764		P-32, S-35		100
Industrial -- Sealed Source/Gauge/Instrument User	Animal carcasses containing C-14 and/or tritium	Research animals	Uncompacted Solid	Carcasses	1.396		C-14, H-3		50.000

Table A-4. Reactive waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students -- No EPA Classification	Other biological waste	Research	Liquid	Formaldehyde	0.191	D003	H-3	A	0.026
Academic 10,000-20,000 Students -- No EPA Classification	Lead-Containing Waste - Organic liquids	Research -- Staining procedure	Liquid	Osmium tetraoxide	0.019	D003	U-238	A	0.00003
Industrial -- Manufacturing (50 200 employees on site) -- Large quantity generator (>1,000 kg/month)	Other -- Metal fines	Cleaning / grinding of magnesium - 2% thorium metal castings	Solid	Metal Cleaning Solutions	9.309	D003	Th-232	A	7.100
Industrial	Other (Mg-Th alloy)			Mg, Th	3.444				
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	Potassium cyanide	0.004	D003	S-35	A	0.5
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	Sodium cyanide	0.004	D003	C-136	A	0.5
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Surplus reagent chemicals and by products used in chemistry lab setting "lab packs"	Solid Uncompacted	Thorium Nitrate	0.372	D003	Th-232	A	0.102

Table A-5. Characteristic metals waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students	Other - Arsenic and 32P			Arsenic	0.051	D004	P-32		
Industrial	Other (Specify) -- Barium, Lead			Barium, Lead	24.623				
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Aqueous - Absorbed -- Toxic	Radioanalytical laboratory procedures, laboratory counting procedures	Uncompacted Solid	Lead	1.396	D008	H-3, K-40	A	0.000
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Cr-51	Absorbed liquid	Chromate	0.065	D007	Cr-51	A	0.1
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Aqueous -- Absorbed	Decontamination	Aqueous	Lead, mercury, barium, chromium	0.291	D008, D009, D005, D006, D007	Co-60, Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Aqueous -- Solidified	System maintenance	Aqueous	Chromate	0.872	D007	Co-60, Co-58, Fe 55	A	0.680
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Education and research	Aqueous	Metals	0.382		I-125		50
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity reactor (>1000 kg/month)	Mercury Containing Waste (Liquids)	Lab Analysis	Aqueous	Mercury	0.043	D009	Co-60, Cs-134, Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor	Mercury-Containing Waste (Liquids)	Laboratory analysis	Aqueous	Mercury	0.039	D009	Co-60, Cs-137	A	0.040
Industrial -- Large quantity generator (>1,000 kg/month)	Other -- (Specify) -- Aqueous Metal Mixture	Generated by analytical practices	Aqueous	Metal Mixture	8.006				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Other -- (Specify) -- Chromate	Plant component cooling system	Aqueous	Chromate	0.436	D007	Co-60	A	0.019

Table A-5. Characteristic metals waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Large quantity generator (>1,000 kg/month)	Other -- (Specify) -- Mixed Waste - Aqueous Metal Mixture	Generated by analytical practices	Aqueous	Metal Mixture	9.568		H-3, U-238, Th-122	A	1.500
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Chromated Water	Leaks / maintenance on chromated water systems	Bulk liquid	Cromated water	0.436	D007	Co-60, Fe-55, Cs 134, Cs-137, Mn 54	A	0.002
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	RCP's, SIS, changing pumps (any pumps requiring oil)	Bulk liquid	Lead, chromium, selenium	0.668	D008, D007, D010			
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Lead-Containing Aqueous liquids	Biomedical research	Liquid	Aqueous liquid-lead	0.083	D008	U-238	A	1
Academic <10,000 Students -- No EPA Classification	Lead-Containing Waste -- Aqueous liquids	Uranyl acetate misted with lead citrate and osmium oxide. Staining procedure.	Liquid	Osmium oxide, lead citrate	0.019	D003, D008	U-238	A	0
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Research	Liquid	Sodium chromate	0.038	D007	Cr-51	A	4
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Paint solvents, Paint thinner. 27.3 FT3 (Waste shipped January 1991 to licensed waste processor)	Liquid	Lead, Mercury, Cadmium	0.793	D008, D009, D006	Mn-54, Co-60, Fe-55, Fe-59, Co-58, Ni-63, H-3, I-129, C-14	A	0.021
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1,000 kg/month)	Mercury-Containing Waste: Elemental mercury	Level indications, barometer	Liquid	Mercury	0.029	D009	Co-60, Cs-137, Mn-54	A	0.000
Medical (non-Federal) --Research - Large quantity generator (>1000 kg/month)	Other -- Specify (Liquid Chromium)	Biomedical research	Liquid	Chromium	0.001	D007	Cr-51	A	1

Table A-5. Characteristic metals waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (<100-1000 kg/month)	Biological Waste (Non-infectious)	Autoradiography	Liquid/Solid	Mercury	0.698	D009	H-3, C-14	A	0.470
Academic >20,000 students -- No EPA Classification	Lead-Contaminated trash	Precipitated	Noncompacted Solid	Lead	0.168	D008	Pb-210	A	0.003
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Oil/water separator sludge	Wastewater treatment (OWS)	Sludge	Cr, Pb. Va	4.940		Co-60, Cs-137		0.010
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Surface Impoundment sludge	Wastewater treatment (SI)	Sludge	Pb, Ni, Va	28.331		Co-60, Cs-137		0.005
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Ion Exchange Resins -- Dewatered	Ion-exchange of process liquids and liquid effluents from treatment of chromated water.	Solid	Ion exchange resin containing chromium	0.218	D007	Co-60, Fe-55, Cs 134, Cs-137	A	0.003
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste	Activated by Cyclotron in 1960's - discovered in 1990	Solid	Lead	0.191	D008	Bi-207	A	10
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing waste	Blankets, sheeting, and pellets used for shielding	Solid	Lead	0.291	D008			
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste	Maintenance and repair of U.S. Navy ships	Solid	Lead	4.894	D008	Co-60	A	0
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste	Shielding	Solid	Pb	0.023	D008	C0-60, uranium (nat)	A	0
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Lead-Containing Waste - Other	Shavings from lead bricks	Solid	Lead	0.058	D008	Co-60, Cs-137	A	0.000

Table A-5. Characteristic metals waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Lead-Containing Waste - Sheeting	Shielding	Solid	Lead	0.581	D008	Co-60, Cs-137	A	0.000
Industrial -- Research & Development -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste. Lead shielding.	I125 contaminated shielding	Solid	Lead	0.931	D001	I-125	A	10.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Lead-Containing Waste: Batteries	High Lift Equip	Solid	Battery	0.015	D008			
Nuclear Reactor Facility -- Pressurized Water Reactor	Lead-Containing Waste: Blankets	Damaged shielding	Solid	Lead	0.218	D008	Co-60, Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Blankets	Plant maintenance	Solid	Lead	0.218	D008	Co-60, Co-58, Fe 55	A	0.170
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Blankets	Shielding	Solid	Lead	0.436	D008	H-3, Fe-55, Ni-63, Co-60, Nb-95, Cs-137, Cs-134, Co-58, Mn-54	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Lead-Containing Waste: Other	Penetration sealant	Solid	Lead	0.436	D008	Co-60, Cs-137	A	0.000
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Shielding	Contaminated shielding	Solid	Lead	0.026	D008	Cs-137	A	0.01
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1,000 kg/month)	Lead-Containing Waste: Shielding	Contaminated shielding	Solid	Lead	0.174	D008	Co-60, Cs-137, Mn-54	A	0.000

Table A-5. Characteristic metals waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Hospital >750 beds -- Large quantity generator (>1,000 kg/month)	Lead-Containing Waste: Shielding	Patient diagnostic procedures, laboratory counting procedures, biomedical research, equipment quality control	Solid	Metallic Lead	0.027	D008	Pm-147	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Shielding	Pipe penetration shielding	Solid	Lead	1.090	D008	H-3, Fe-55, Ni-63, Co-60, Nb-95, Cs-137, Cs-134, Co-58, Mn-54	A	0.000
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Shielding	Research	Solid	Lead	0.459	D008	P-32, Na-22	A	1
Academic >20,000 students	Lead-Containing Waste: Shielding	Research. / Lead shielding contaminated.	Solid	Lead	0.004	D008	P-32, I-125	A	0.01
Medical (Non-Federal) -- Hospital 250-750 beds -- Small quantity generator (100-1,000 kg/month)	Lead-Containing Waste: Shielding	Retired brachytherapy sources in shielded casks. Lead shielding	Solid	Lead	0.233	D008	Cs-137	B	1,180.300
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Shielding	Waste from research activities	Solid	Lead Shielding	0.038	D008	I125	A	5
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Mercury-Containing Waste	Tracer Preservative	Solid	Mercury	0.774	D009	I-125, Co-57	A	75.76
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Mercury-Containing Waste (Solids)	Glass - contaminated	Solid	Mercury	0.070	D009	Th-232	A	0.24

Table A-5. Characteristic metals waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Mercury-Containing Waste: Elemental mercury	Lab analytical process and maintenance	Solid	Mercury	7.387	D003	U-235, U-238	A	255.600
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Other (Specify) -- Chromium Waste - Flammable	U-recovery dissolution and calcination process	Solid	Chromium	18.203	D007	U-235, U-238	A	3,272.600
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 kg/month)	Other -- Metal fines	Melting and processing of magnesium - 2% thorium metal	Solid	Barium	69.819	D005	Th-232	A	30.000
Industrial -- Waste Broker/Processor -- Large quantity generator (>1,000 kg/month)	Incinerator Ash or Residuals	Incinerator ash of LLRW	Solid/Ash	Cadmium, Chromium, Lead	76.683	D006, D007, D008	Co-60, Cs-137, Fe-55	A	0.000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Irradiated Reactor or Pool Components	Spent reactor control rods	Uncompacted solid	Cadmium	0.034	D006	Cd-109, Ag-109m, Cd-113m, Fe-55, Co-60	B	84000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Lead-Containing Waste -- Shielding	Unable to treat, ship, or dispose of the waste. Lead inside activated shielding components.	Uncompacted solid	Lead	0.687	D008	Co-60, Mn-54	A	0.5
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste	Research waste	Uncompacted solid	Lead	0.287	D008			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste -- Other	Ash from station stack	Uncompacted solid	Lead	2.789	D008	Co-60, Cs-137		1.000

Table A-5. Characteristic metals waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (50-200 employees on site) -- Conditionally exempt small quantity generator (<100 kg/month)	Lead-Containing Waste: Lead-contaminated trash	Manufacture of optical filters. Thin film evaporator	Uncompacted Solid	Lead	4.189	D008	Th-232	A	0.220
Industrial	Lead-Containing Waste			Lead	7.035	D008			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Sandblasting. Plant maintenance and decontamination activities at nuclear powered generating utility	Uncompacted solid	Gritblast	0.218	D006	Co-60, Cs-137, Cs-134	A	2.310
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	Chromium	0.038	D007	Cr-51	A	0.5
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Maintenance and repair of U.S. Navy ships	Solid	Chromate	2.834	D007	Co-60	A	0

Table A-6. Characteristic organics waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Biomedical Research laboratory	Compacted solid	Acetronotrile, chloroform, methanol	1.452	D001, D022	H-3, C-14, S-35	A	30
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic (Solvents, Chlorinated Solvents, etc.)	DNA Extraction experiments	Solid	Chloroform	0.071	D022	P-32	A	1
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Research	Liquid	Chloroform	0.038	D022	H-3	A	15
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquid Organic - (Solvents, Chlorinated Solvents, etc.) -- Toxic	Waste from research - DNA extractions	Bulk Liquid	Chloroform	0.002	D022	P-32	A	0.300
Industrial -- Research and Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Cleaning of equipment and contaminated components. HPLC tests	Bulk Liquid	Chloroform	0.018	D022	H-3	A	1.000
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Biomedical research	Liquid	Chloroform	32.977	D022			
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from the manufacture of labeled compounds	Liquid	Organic solvents	2.886	D022, D001	H-3	A	45561.9
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Aqueous -- Solidified	From biochemical and environmental fate studies	Liquid	Pesticides	0.186		C-14	A	100.000

Table A-6. Characteristic organics waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Solidified Evaporator Bottoms/Concentrates/Sump Sludge	Concentrates/sludges. From organic synthesis of labeled compounds	Liquid	Pesticides	0.002		C-14	A	3,000.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Other biological waste (Non-infectious)	Plant and animal waste (milk, eggs, urine, feces) from biochemical studies	Liquid and Solid	Pesticides	0.512		C-14	A	100.000
Academic >20,000 students - Conditionally exempt small quantity generator (<100 kg/month)	Liquids organic - (Solvents, Chlorinated Solvents, etc.) - Reactive	Research	Liquid	Solvents	0.038	D022	P-32, S-35	A	6
Academic >20,000 students - Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Trichloromethane, Phenol	0.051	D022			

Table A-7. F001 and F002 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development	Ion Exchange Resins -- Solidified	Waste from research	Aqueous	Org-Cl	2.814	F001	H-3, C-14	A	25,000.000
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Maintenance and repair of U.S. Navy ships	Aqueous	1,1,1-trichloroethane	0.258	F002	Co-60	A	0
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Trichloroethylene	0.042	F002			
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Toxic	Degreasing, cleaning operations	Aqueous	Spent Solvents F001	6.332				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	freon laundering garment waste	Bulk	Trichloro-ethylene, freon	0.145	F002	Fe-55, Cs-137	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic (Freon)	Dry Cleaning Solvent/sludge	Bulk Liquid	Freon	0.872		Co-60, Cs-137		1.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Abandoned Decommissioned Laundry Unit	Bulk liquid	1,1,2-Trichloro-1,1,2-Trifuoroethane	0.334	F002	Ag-110, Co-60, Cs-134, Cs-137, Mn-54, Sb-122		0.250
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Clean / decontamination of equipment and protective clothing	Bulk liquid	Chloroflouro-carbons	1.104	F001			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Component degreasing, routine maintenance, area clean-up	Bulk liquid	Halogenated solvents	0.436	F001			
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Decontamination pressure washer	Bulk liquid	Halogenated degreasing solvents	0.102	F001			

Table A-7. F001 and F002 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Degreasing Solvents	Bulk liquid	Freon, solvents	1.671	F001	Co-60, Cs-137		0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Evaporator bottoms from dry cleaning and decon. machines and Freon in machine filters	Bulk liquid	1, 1, 2-trichloro-1, 2, 2-trifluoroethane and Freon-113	0.482	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Maintenance activities	Bulk liquid	Trichloro-trifluoroethane distillation bottoms	1.090	F002	Co-60, Fe-55, Cs 134, Cs-137	A	0.001
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Freon	Tool decon unit / dry cleaning facility	Bulk liquid	Freon	0.087	F001			
Industrial -- Decontamination facility & waste reduction	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Bulk Liquid	Mixture	4.798	F001	H-3	A	1.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint solvent waste	Bulk Liquid	Freon	1.069	F001	Co-60, Cs-134, Cs-137		0.001
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint/Solvent waste	Bulk Liquid	Chlorinated Solvents	0.154	F001	Co-60, Cs-137, Mn-54		0.001
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other - (Specify) -- Liquid Freon	Dry cleaning filters cartridges and sludges	Bulk liquid	Freon	5.521	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils	Dry cleaners, freon degreasing, cleaning solvent contaminated oils	Bulk liquid	Halogenated cleaning and degreasing wastes	3.705	F001	H-3, Co-60, Cs-134, Cs-137	A	163.200

Table A-7. F001 and F002 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Generated from oil used in refrigeration units	Bulk Liquid	Freon	0.726	F001	Co-60, Cs-137		0.010
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Cleaning agent	Bulk liquids	Trichlorotri-fluoroethane	0.145	F002			
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Degreasing	Bulk liquids	Solvents	1.220	F002	Co-60, Cs-137	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Used as a cleaning agent	Bulk liquids	Freon / solvents	1.220	F001	Co-60, Cs-137, Mn-54	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Cleaning agent	Bulk liquids	Organics	0.145	F001, F002			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity reactor (>1000 kg/month)	Liquid organic -- (solvents, chlorinated solvents, etc.)	Cleaning Turbine Parts	Liquid	Freon	0.218	F001, F002, U075, U121		A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Decontamination / cleaning tools and equipment	Liquid	Waste solvent	0.058	F001	Co-60, Cs-134, Cs-137		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Degreasing Activities	Liquid	Spent solvent	0.145	F001	Fe-55, Co-58, Co 60, Ni-63, Cs-134, Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Dry Cleaning Units	Liquid	1, 1, 2-Trichloro-1, 2, 2-Trifluoroethane	0.036	F002	Co-60, Cs-137	A	0.020

Table A-7. F001 and F002 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Solvents used in degreasing/dry cleaning	Liquid	Halogenated solvents	0.436	F002	H-3, Fe-55, Ni-63, Co-60, Nb-95, Cs-137, Cs-134	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Tool Decon unit	Liquid	Freon still bottoms	0.029	F001			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)		Liquid	SKL-NF-ZC-7B (spot check)	0.145	F002			
Industrial -- Decontamination facility & waste reduction -- No EPA Classification	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Cleaning of contaminated components	Liquid	1,1,2-Trichloro-1,2,2-Trifluoroethane	0.528	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Distillation Bottoms	Liquid	Freon	0.436	F002	Co-60, Mn-54, Cs-134, Cs-137	A	0.200
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory experiments	Liquid	Halogenated Solvents	0.186	F001			
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Maintenance Degreasing	Liquid	Waste CFC-11	0.141			A	1
Academic >20,000 students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Hexachlorobenzene	0.084	F002	C-14	A	0
Industrial	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Liquid	Methylene Chloride	1.368	F001			
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Other (Specify) -- TCA/TCE waste - Reactive	Research and development distillation process	Liquid	TCA/TCE	0.183	F002	U-235, U-238	A	0.055
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Paint (& Thinner)	Used as a cleaning agent	Liquid	Paint / thinner	0.174	F001	Co-60, Cs-137, Mn-54	A	0.000

Table A-7. F001 and F002 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Solidified Evaporator Bottoms/Concentrates/ Sump Sludge	Evaporation of liquid miscellaneous radwaste	Liquid	Saf-T - still bottoms - D039	0.040	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Solidified Evaporator Bottoms/Concentrates/ Sump sludge	Tool decontamination	Liquid	Freon TF - still bottoms	0.012	F002	Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Pump oil	Liquid	Halogenated solvents	1.308	F001	H-3, Fe-55, Ni-63, Co-60, Nb-95, Cs-137, Cs-134	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Solvent contaminated waste oil	Liquid	Freon 112	7.264	F002	Cs-134, Cs-137, Co-58, Co-60	A	2.500
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	HEPA filters from reactor and radwaste bldgs. HVAC; filters from dry cleaning and decon. machines	Liquid solid	1, 1, 2-trichloro-1, 2, 2-trifluoroethane and Freon-113	0.363	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Still bottoms from recovery	Semi-liquid sludge	Halogenated solvents	0.872	F002			
Industrial -- Research & Development	Filters, Mechanical	Filters from Freon decon machine	Solid	Still Bottoms	7.096	F002	Co-60, Mn-54, Fe-55	A	62.400
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	Filtration of process liquids and liquid effluents	Solid	Trichlorotri-fluoroethane on cartridge filters	0.654	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	RCS and Freon mechanical purification	Solid	Freon	0.291	F002	Co-60, Cs-134, Cs-137		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other (Specify) -- Solid Freon Filters	Tool decontamination	Solid	Freon filters	0.145	F002			

Table A-7. F001 and F002 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Other - (Specify)	Dry cleaning filters/sludge	Unc. Solid & Bulk Liquid	Freon	0.854	F002	Co-60, Cs-134, Cs-137		0.001
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	routine operations occurring as a result of operating a nuclear power plant; mechanical filter changeout, ion exchange resin exchange filter backflushing. in plant Sys.. discharges, etc.	Uncomp. solid	1, 1, 2-trichloro-1, 1, 2-trifluoroethane	0.073	F002			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Dry Cleaning Filter Cartridges and Sludge		Uncomp. solid / bulk lq.	Freon	33.706	F002	C0-60, Mn-54		55.020
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filter Media -- Dewatered	Filter changeout on dry cleaners. Processing and clean-up of primary, secondary water, laundry operation, used oil processing	Uncompact, solid	Dry cleaner filters, laundry processing	1.090	F002	Co-60, Cs-137, Cs-134		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	Filters from recovery	Uncompacted solid	Halogenated solvents	1.090	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Filters, Mechanical	Freon dry cleaning	Uncompacted solid	Trichlorotri-fluoroethane	2.615	F002			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify)	Dry cleaning filters	Uncompacted solid	Freon	1.743	F002	Co-60, Cs-137		1.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Filters, Mechanical	Mechanical filtration of liquid effluent and decontamination equipment	Uncompacted solids	Freon filters	1.860	F001	Co-60, Cs-137, Mn-54	A	0.000

Table A-8. F003 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Industrial -- Research & Development	Liquid Organic - (Solvents, Chlorinated Solvents, etc.)	Laboratory research	Absorbed Liquid	Ethyl Acetate	0.186	F003	C-14	A	40.000
Industrial -- Research & Development	Other biological waste (Non-infectious)	Laboratory research - cell labeling. From cleanup procedure	Absorbed Liquid	Ethyl Acetate	0.093	F003	C-14	A	30.000
Industrial -- Research & Development	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratory research. From cleanup procedure	Absorbed Liquid	Ethyl Acetate	0.093	F003	C-14	A	30.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity reactor (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Cleaning Incore Instrumentation	Aqueous	Acetone	0.058	F003	Co-60, Co-58, Mn-54	A	1,982.000
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Benzene	0.021	F003			
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Xylene	0.021	F003			
Government -- Federal (hospital)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Chemical separation. Medical research	Bulk	Mixtures	0.446	F003	P-32	A	1.000
Academic (<10,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	HPLC	Bulk liquid	Acetonitrile, methanol	0.436	D001,F003	H-3, C-14	A	0.24
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory generated. Analysis - Related waste.	Bulk Liquid	Xylene	3.360	F003	C-14	A	5.275
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Bulk liquid	Liquid organic	0.316	F003	H-3, C-14	A	1

Table A-7. F001 and F002 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Other - (Specify)	Dry cleaning filters/sludge	Unc. Solid & Bulk Liquid	Freon	0.854	F002	Co-60, Cs-134, Cs-137		0.001
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	routine operations occurring as a result of operating a nuclear power plant; mechanical filter changeout, ion exchange resin exchange filter backflushing. in plant Sys.. discharges, etc.	Uncomp. solid	1, 1, 2-trichloro-1, 1, 2-trifluoroethane	0.073	F002			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Dry Cleaning Filter Cartridges and Sludge		Uncomp. solid / bulk lq.	Freon	33.706	F002	C0-60, Mn-54		55.020
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filter Media -- Dewatered	Filter changeout on dry cleaners. Processing and clean-up of primary, secondary water, laundry operation, used oil processing	Uncompact, solid	Dry cleaner filters, laundry processing	1.090	F002	Co-60, Cs-137, Cs-134		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	Filters from recovery	Uncompacted solid	Halogenated solvents	1.090	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Filters, Mechanical	Freon dry cleaning	Uncompacted solid	Trichlorotri-fluoroethane	2.615	F002			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify)	Dry cleaning filters	Uncompacted solid	Freon	1.743	F002	Co-60, Cs-137		1.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Filters, Mechanical	Mechanical filtration of liquid effluent and decontamination equipment	Uncompacted solids	Freon filters	1.860	F001	Co-60, Cs-137, Mn-54	A	0.000

Table A-8. F003 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Industrial -- Research & Development	Liquid Organic - (Solvents, Chlorinated Solvents, etc.)	Laboratory research	Absorbed Liquid	Ethyl Acetate	0.186	F003	C-14	A	40.000
Industrial -- Research & Development	Other biological waste (Non-infectious)	Laboratory research - cell labeling. From cleanup procedure	Absorbed Liquid	Ethyl Acetate	0.093	F003	C-14	A	30.000
Industrial -- Research & Development	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratory research. From cleanup procedure	Absorbed Liquid	Ethyl Acetate	0.093	F003	C-14	A	30.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity reactor (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Cleaning Incore Instrumentation	Aqueous	Acetone	0.058	F003	Co-60, Co-58, Mn-54	A	1,982.000
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Benzene	0.021	F003			
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Xylene	0.021	F003			
Government -- Federal (hospital)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Chemical separation. Medical research	Bulk	Mixtures	0.446	F003	P-32	A	1.000
Academic (<10,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	HPLC	Bulk liquid	Acetonitrile, methanol	0.436	D001,F003	H-3, C-14	A	0.24
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory generated. Analysis - Related waste.	Bulk Liquid	Xylene	3.360	F003	C-14	A	5.275
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Bulk liquid	Liquid organic	0.316	F003	H-3, C-14	A	1

Table A-8. F003 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Industrial -- Research and Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research and development tracer studies, labeling studies, metabolism studies, in vitro and synthesis	Bulk liquid	Methanol	1.759	F003	C-14	A	2.5
Academic >20,000 students -- Large quantity generator (>1000 Kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research laboratories	Bulk liquid	Acetone	0.011	F003	P-32, I-125, S-35	A	0.3
Academic >20,000 students -- Large quantity generator (>1000 Kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research laboratories	Bulk liquid	Methanol	0.011	F003	H-3, C-14	A	0.1
Industrial -- Research and Development -- Small quantity generator (100-1,000 Kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from histology research	Bulk Liquid	Xylene	0.018	F003	H-3	A	1.400
Government -- Federal (Research & Development) -- Large quantity generator (>1000 Kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from medical research	Bulk liquid	Xylene	5.463	F003	H-3, C-14, P-32, I-125	A	4.5
Academic >20,000 students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Bulk liquid	Ether	0.029	F003	C-14	A	0
Academic >20,000 students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Bulk liquid	Methanol	0.029	F003	C-14	A	1.25
Industrial -- Decontamination facility & waste reduction	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Bulk Liquid	Xylene	0.696	F003		A	0.000
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 Kg/month)	Other - (Specify)	Analytical grade methanol	Bulk liquid	Methanol	0.042	F003	H-3, C-14	A	0.57
Medical (Non-Federal) -- Research -- Conditionally exempt small quantity generator (<100 Kg/month)	Other Biological waste (Non-infectious)	Culture media used during cell labelling procedures. Pure methanol used in drying.	Bulk Liquid	Methanol	0.186	F003	H-3	A	0.560

Table A-8. F003 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Aqueous -- Absorbed	Cell based and tube based assay waste (medical)	Liquid	Methanol	0.093	F003	S-35, I-125	A	1.000
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Biomedical research	Liquid	Methanol, acetone, xylene	32.977	F003	H-3, C-14, P-32, S-35, I-125	A	3051
Medical (non-Federal) -- Research -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Biomedical research	Liquid	Flammable solvents	0.015	F003	H-3	A	22.08
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory experiments	Liquid	Methanol	0.186	F003	C-14	A	4.000
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Tracer manufacturing	Liquid	Pyridine, methanol	0.035	D001, F003	Co-57	A	100
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- flammable	Gasket replacement	Liquid	Filmco special ind. solvent D001	0.057	D001, F003	Cs-137	A	0.000
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Liquid	Non-Halogenated Solvents	0.652	F003			
Industrial -- Decontamination facility & waste reduction -- No EPA Classification	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Liquid	Xylene	0.528	F003	H-3, Co-60, Cs-137	A	0.003
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Liquid	Waste toluene	1.566	F003	H-3, C-14, P-32, S-35, I-125	A	111.7
Industrial -- Manufacturing >200 employees on site -- Large quantity generator (>1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Cleaning and refurbishment of nuclear components. Wipe rags and paint brushes	Uncompacted Solid	Acetone, Xylene	0.264	F003	Co-60, Cs-137	A	1.000

Table A-8. F003 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Industrial -- Manufacturing >200 employees on site -- Large quantity generator (>1,000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Cleaning and refurbishment of nuclear components. Wipe rags and paint brushes	Compacted Solid	Acetone, Xylene	0.264	F003	Co-60, Cs-137	A	1.000

Table A-9. F005 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Gel electrophoresis	Absorbed Liquid	Toluene	1.396	F005	I-125, P-32, S-35, H-3, C-14	A	10.810
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint/solvent waste	Bulk liquid	MEK non-halogenated flammable solvent	11.042	F005, F003, D001			
Government: -- Federal (hospital) - Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Extractions	Bulk Liquid	Toluene	0.116	F005	C-14, Ca-45	A	2.000
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Lab counting procedures. Research	Bulk liquid	Xylene, ethyl acetate, methanol, toluene	1.835	F003, F005	C-14, S-35, P-32	A	437
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory generated. Analysis - Related waste.	Bulk Liquid	Toluene	3.360	F005	C-14	A	5.275
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	LSC, laboratory research	Bulk liquid	Toluene, acetone	0.168	F005, F003	H-3, C-14	A	0.208
Academic <10,000 Students - Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Organic	Bulk liquid	Toluene, xylene	0.042	F005, F003	H-3		11.3
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research activities	Bulk Liquid	Benzene	35.482	F005	C-14	A	160.000
Industrial -- Research and Development -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from laboratory research	Bulk Liquid	Toluene, Xylene	26.382	F005, F003	H-3, C-14	A	1,000.000

Table A-9. F005 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Column elutions of environmental chemistry studies.	Bulk liquids	Solvents	0.405	D001, F005	H-3, C-14	A	32
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Biomedical research	Liquid	Toluene	32.977	F005			
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Oxidization of biological samples; HPLC analysis	Liquid	Toluene, ignitability	0.167	F005, D001	H-3, C-14, P-32, Ca-45	A	10
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Liquid	Xylene, Toluene	3.518	F003, F005	H-3, C-14, I-125	A	46,000.000
Industrial -- Research and Development -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Liquid	Toluene, Xylene	13.191	F005, F003	P-32, S-35, Cr-51	A	50.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Paint: Epoxy-based	Painting	Liquid	Xylene, Toluene	0.654	F003, F005	Co-60	A	0.010
Academic <10,000 Students - Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	All generated from in vitro laboratory experiments only C14 and H3. All are deregulated waste.	Organic liquid	Toluene	0.084	F005	H-3, C-14	A	1.3
Government -- Federal (Military) - Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Solidified	Maintenance and repair of U.S. Navy ships	Solid	Acetone, MEK	7.985	F003, F005	Co-60	A	0

Table A-9. F005 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	By product of plant maintenance	Solid	Isopropanol, acetone, methyl ethyl ketone	0.436	D001, F003, F005	Mn-54, Co-60, Fe-59	A	3.880
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Research cleanup	Solid	Toluene, Xylene	0.528	F005, F003	H-3, C-14	A	0.000
Academic <10,000 Students - Small quantity generator (100-1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Emptied scintillation vials	Uncompacted solid	Toluene	0.071	F005	P-32	A	0
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted -- Flammable	LSC fluid cleanup	Uncompacted solid	Xylene, toluene	0.104	F003, F005	H-3, C-14	A	0.001
Industrial -- Research & Development (not-for-profit research & development lab) -- Large quantity generator (>1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Decontamination of facility and equipment	Uncompacted Solid	F-Listed Solvents	4.189	F001-5	C-14, H-3		0.000

Table A-9. F005 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Column elutions of environmental chemistry studies.	Bulk liquids	Solvents	0.405	D001, F005	H-3, C-14	A	32
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Biomedical research	Liquid	Toluene	32.977	F005			
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Oxidization of biological samples; HPLC analysis	Liquid	Toluene, ignitability	0.167	F005, D001	H-3, C-14, P-32, Ca-45	A	10
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Liquid	Xylene, Toluene	3.518	F003, F005	H-3, C-14, I-125	A	46,000.000
Industrial -- Research and Development -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)		Liquid	Toluene, Xylene	13.191	F005, F003	P-32, S-35, Cr-51	A	50.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Paint: Epoxy-based	Painting	Liquid	Xylene, Toluene	0.654	F003, F005	Co-60	A	0.010
Academic <10,000 Students - Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	All generated from in vitro laboratory experiments only C14 and H3. All are deregulated waste.	Organic liquid	Toluene	0.084	F005	H-3, C-14	A	1.3
Government -- Federal (Military) - Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Solidified	Maintenance and repair of U.S. Navy ships	Solid	Acetone, MEK	7.985	F003, F005	Co-60	A	0

Table A-9. F005 waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	By product of plant maintenance	Solid	Isopropanol, acetone, methyl ethyl ketone	0.436	D001, F003, F005	Mn-54, Co-60, Fe-59	A	3.880
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Research cleanup	Solid	Toluene, Xylene	0.528	F005, F003	H-3, C-14	A	0.000
Academic <10,000 Students - Small quantity generator (100-1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Emptied scintillation vials	Uncompacted solid	Toluene	0.071	F005	P-32	A	0
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted -- Flammable	LSC fluid cleanup	Uncompacted solid	Xylene, toluene	0.104	F003, F005	H-3, C-14	A	0.001
Industrial -- Research & Development (not-for-profit research & development lab) -- Large quantity generator (>1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Decontamination of facility and equipment	Uncompacted Solid	F-Listed Solvents	4.189	F001-5	C-14, H-3		0.000

Table A-10. P and U listed waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	H3	Absorbed	Triglycerol	0.145	U126	H-3	A	5.65
Industrial -- Manufacturing (50 200 employees on site) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Aqueous -- Absorbed	Manufacture of in-vitro diagnostic kits. Plastic, paper, glass.	Absorbed Aqueous Liq.	Sodium Azide	7.680	P105			
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Radioisotopic biochemical assays	Absorbed liquid	Benzo(A)pyrene	0.069	U022	H-3		0.351
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Phenol	0.021	U188			
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research and manufacturing. HPLC Effluent	Bulk Liquid	Acetonitrile	0.946	U003	I-125	A	10.000
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Bulk liquid	Chloroform	0.034	U022	C-14		0.9
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Bulk liquid	Methanol	0.034	U154			
Industrial -- Research and Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Bulk Liquid	Tetrahydrofuran	0.035	U213	H-3	A	2.000
Industrial -- Manufacturing (>200 employees on site) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Toxic	Product Separation	Bulk liquid	Acetonitrile, methanol	0.264	U003, U154		A	75

Table A-10. P and U listed waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Research	Liquid	Formaldehyde	0.038	U122	H-3, C-14	A	0.5
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Research	Liquid	Methanol	0.038	U154	H-3	A	0.5
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed	Research	Liquid	Phenol	0.038	U188	H-3, C-14	A	2
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory research practices. Liquid chromatography and LSC	Liquid	Methyl alcohol	0.026	U154	H-3, C-14	A	0.01
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Liquid	Methylene Chloride, Chloroform (U044)	2.513	U044, U045			
Medical (non-Federal) -- Research -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Biomedical research	Liquid	Phenol	0.000	U188			
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Research Procedure	Liquid	Chloroform	0.002	U044			
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Research Procedure	Liquid	Methanol	0.001	U154	H-3	A	0.8
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Waste from research	Liquid	Phenol	0.005	U188	P-32	A	1
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Other -- (Specify) -- Liquid Iridite 14-2 (Chromic Acid Mixture)	Chromic acid mixture	Liquid	Iridite 14-2	0.058	U032			

Table A-10. P and U listed waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Biological Waste (Non-infectious)	H3	Liquid vials	Triglycerol	0.153	U126	S-35	A	0.002
Academic <10,000 Students - No EPA Classification	Ion Exchange Resins -- Dewatered	Containing C-14 Label	Solid	Benz (A) Anthracene	0.036	U018	C-14		0.001
Academic <10,000 Students - No EPA Classification	Ion Exchange Resins -- Dewatered	Containing C-14 Label	Solid	Benzo (A) Pyrene	0.036	U022			
Academic <10,000 Students - No EPA Classification	Other - (specify) - Beryllium	Sealed sources	Solid	Beryllium	0.484	P015	Pu-239	A	6000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Cell based and tube based assay waste (medical)	Solid	Acrylamide	0.093	U007			
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Lab research waste	Uncompacted solid	Dieldrin	0.004	P037	C-14	A	0.001
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Cell based and tube based assay waste (medical)	Solid	Sodium Azide	0.931	P105	S-35, I-125	A	0.200
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Hydrazine Waste	Off-spec. hydrazine and spill clean-up materials	Solid / liquid	Hydrazine liquid	0.145	U133	Co-60, Cs-134, Cs-137		0.000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Absorbing paper and disposal glassware generated in radioisotopes biochemical assays and Ni63 wipe test	Trash/solid waste	Benzo(A)pyrene	0.172	U022	H-3		1.877
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Contaminated lab trash (gloves, pipet tips, bench paper, etc.) produced during DNA labelling experiments. Biochemistry protein assays.	Uncompacted Solid	Toluene, Granite Salts	2.095	F005, P030	C-14	A	0.415

Table A-11. Oil waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Solvent containing waste oil	Waste from research and service contract	Liquid	Vacuum Pump Oil	0.046		H-3, S-35	A	0.346
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Generated from cleaning oily valves with Varsol solvent	Bulk liquid	Mineral spirits	0.872	D001	Co-60, Cs-137		0.001
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Miscellaneous maintenance activities	Bulk liquid	Solvents in oil	0.436		Co-60, Fe-55, Cs-134, Cs-137, Mn-54	A	0.010
Industrial -- Manufacturing (<50 employees on site) -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Vacuum pumps	Bulk Liquid	Waste Oil	0.473				
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)	Biomedical research	Liquid	Waste oils	0.127	D001	H-3, C-14	A	5
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Maintenance of pumps, motors, etc.	Liquid	Used oil	11.623	D001	Co-60, Cs-134, Cs-137		0.000
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Used pump oils	Liquid	Benzene	0.141	D018	U-235, U-238	A	0.001
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Plant maintenance	Bulk liquid	Solvent contam. oil	0.436	F001	Co-60, Co-58, Fe-55	A	0.340

Table A-11. Oil waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Solvent contaminated lubricating oil	Bulk liquid	Chloroflouro-carbons	0.058	F001			
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Degreasing	Bulk liquids	Solvents	1.220	F001	Co-60, Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Miscellaneous pumps	Liquid	Oil with Halogenated Solvents	2.943	F001	Cs-137, Co-60, Cs-134, Sb-125, Mn-54, Ag-110M, Ce-141	A	1.039
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (2)	Equipment oil changes	Liquid (oil)	Waste oil, halogenated solvents	0.726	F001			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal oils from pumps for example) -- Solvent-contaminated waste oil	Decontamination solutions	Bulk Liquids	Spent Solvents	2.615	F001, F002, F003, F004, F005	H-3, C-14, Co-60, Cs 134, Cs-137	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils	Painting Operations	Liquid	1,1,1-Trichloroethane, acetone	1.090	F001, F003	Zn-65, Co-60, Mn-54	A	0.100
Nuclear Reactor Facility -- Pressurized Water Reactor	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Oil tests	Oil	Toluene	0.029	U220			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Vitrified Ash or Resins	Maintenance	Absorbed liquid	Waste oil	1.308		Co-60, Cs-137, Cs-134, Zn-65	A	0.000
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Manufacture of electron tubes	Absorbed Liquid	Vacuum Pump Oil	0.465		H-3	A	0.000

Table A-11. Oil waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing >200 employees on site -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Residual oil from nuclear components. Lubricants of contaminated component	Aqueous	Oil	0.791		Co-60, Cs-137	A	30.000
Academic <10,000 Students	Waste oil free from solvent contamination	Oil from circulation and vacuum pumps, research and reactor operation	Bulk liquid	Waste oil	0.004	D001	Co-60, Mn-54	A	0.001
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Waste oil free from solvent contamination	Pump oil	Bulk liquid	Waste oil	0.084		Zn-65	A	0.1
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Various pump casting oil changeout and misc. oil leakage accumulation in condensate pit sump.	Bulk liquid	Waste oil	1.090		Co-60, Cs-137, Cs-134	A	0.349
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Equipment oil change (e.g.: reactor coolant pumps)	Bulk liquid	Waste oil	4.577	D001	Cs-137, Cs-134	A	0.002
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Mechanical / equipment lubricating oil	Bulk liquid	Waste oil	0.145				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Oil accumulated from pump leakage	Bulk liquid	Motor oil	0.776				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Pump and turbine waste oils	Bulk liquid	Waste oil - Calif. listed	69.156		Cs-137, Cs-134, C0-60	A	1.600
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Waste oils - free from solvent contamination	Waste pump oil	Bulk liquid	Waste oil	0.316	D001	H-3	A	2

Table A-12. Other organic waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable		Bulk liquid	Paraffin - naphthenes	0.029				
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from R & D labs	Bulk liquid	Acetone, hexane, methylene chloride, methanol, acetonitrile, chloroform, ethyl acetate	1.407		C-14	A	150
Industrial -- Manufacturing (<50 employees on site) -- Large quantity generator (>1,000 kg/month)	Other -- (Specify)	Manufacture of radiolabeled compounds	Bulk Liquid	Hazardous Waste Liquid	3.312				
Government -- Federal	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Chemical laboratory	Liquid	Liquid, organic	0.240				
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid		0.023		Cd-109	A	0
Medical (non-Federal) -- Research -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Biomedical research	Liquid	Chloroform	0.008	F024	C-14	A	0.01
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory Testing	Liquid	Lab solvent	0.211				
Academic <10,000 Students - No EPA Classification	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Mirex	0.084		C-14	A	0.05
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Maintenance painting	Liquid	Waste xylene	0.559				

Table A-12. Other organic waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Laboratory testing	Liquid	Waste acetone	0.070				
Medical (non-Federal) -- Research -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Basic biomedical research and education. LSC and HPLC wastes.	Organic liquids-bulk	Flammable liquids	0.038		H-3, C-14	A	1
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Waste Adhesive	Facility maintenance activities, excess / out of spec..	Solid / liquid	Ignitable liquid	0.029		Co-60, Cs-134, Cs-137		0.000
Medical -- Medical College/Hospital	Organic Solvents			Solvents	0.287				
Industrial	Other (Specify) -- Trichloroethene			Trichloroethene	0.014				
Industrial -- Commercial Radiopharmacy	Organic -- Acetonitrile			Acetonitrile	0.102				
Industrial -- Commercial Radiopharmacy	Organic -- Methanol			Methanol	0.102				
Government -- Federal (Military)	Other (Specify) -- Organic			ORG	24.451				

Table A-11. Oil waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (50 200 employees on site) -- Large quantity generator (>1,000 kg/month)	Waste Oils free from solvent contamination	Vacuum pump oil. Mechanical pumps pumping tritium contaminated systems	Bulk Liquid	Vacuum Pump Oil	0.028		H-3	A	0.006
Industrial -- Research and Development -- Large quantity generator(>1,000 kg/month)	Waste oil free from solvent contamination. Vacuum pump oil.	Pharmaceutical research. Vacuum pump oil.	Gallons	Waste Oil	0.018		H-3, C-14	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oil	Maintenance	Liquid	Waste oil	21.793		Co-60, Cs-137	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)	Equipment lubrication and maintenance	Liquid	Non-hazardous	8.717		Mn-54, Co-60, Fe-59	A	5.000
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)	Pumps	Liquid	waste oils	0.034		S-35	A	0
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example)	Reactor coolant pumps lubricating oil	Liquid	Oil	0.218		Co-60, Cs-137	A	0.002
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal Oils from pumps for example) -- Waste Oil free from solvent contamination	Lubricant	Liquid	Waste Oil	1.090		Co-60, Cs-137, Fe-55, Zn-65	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Plant Maintenance	Liquid	Waste oil / solvent	0.218				
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Lubricating oil - 137.3 FT3 burned as alternate fuel	Liquid	Waste Oils	3.990		Co-60, Cs-137	A	0.006

Table A-11. Oil waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Seal oils and pump lubricant replacement	Liquid	Oil	1.308		Co-60, Mn-54	A	0.130
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Waste Oils -- Waste oils free from solvent contamination	Plant maintenance of equipment and vehicles	Liquid	Waste oil	4.678			A	2
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Vitrified Ash or Resins	Maintenance	Bulk liquid	Waste oil	0.654		Co-60, Cs-137, Cs-134, Zn-65	A	0.000
Industrial	Other (Oil)				1.368				
Industrial	Waste Oil			Oil	3.518				

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Contains H-3 and C-14		H3 and C14	11.879		H-3, C-14		36.19
Industrial -- Manufacturing (<50 employees on site)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation		Scintillation Vials	0.349		H-3	A	0.000
Government -- Federal (Hospital)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)			LSC with 14C, 3H	0.018				
Industrial	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)			14C	31.025				
Academic	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Contains H-3, S-35, Ca-45, P-32, I-125, Na-22, I-131, Co-57		H3,S35,Ca45,P32,I125,Na22,I131,Co57	8.667		P-32, S-35, I-125, Na-22, Ca-45, Co-57, I-131		267.28
Medical (non-federal) -- Medical college/hospital	Other (Specify) -- LSC			LSC	0.042				
Medical (non-federal) -- Medical college/hospital	Other (Specify) -- LSC			LSC	0.042				
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Aqueous -- Absorbed	Aqueous waste disposal method	Absorbed Liquid	Counting Fluid	0.141		C-14	A	9.100
Industrial (not for profit toxicological research institute) -- Conditionally exempt small quantity generator (< 100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Absorbed liquid	Hydrocarbon Solvent	0.352	D001	H-3, C-14		83.100
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory research - counting procedures	Absorbed Liquid		0.372	F003, F005	C-14	A	50.000
Industrial -- Research and Development -- Small quantity	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biotechnology R&D, 14C and 3H	Absorbed liquid	Xylene	0.528	F003	C-14 , H-3	A	5.7
Government -- Federal (Research & Development) -- No EPA	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Absorbed liquid	Xylene, toluene	2.318	F003, F005	H-3, C-14	A	1.059
Academic >20,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Absorbed liquid	Toluene	0.316	F005	H-3, C-14, I-125	A	1

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	Absorbed Liquid	Biocount Scintillation Cocktail	1.489	D001	H-3	A	0.456
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Absorbed liquid	1,2,4-trimethybenzene	0.084	F005	C-14	A	0.1
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	H-3 or C-14 - small volume lab experiments for counting	Absorbed Liquid	Toluene	0.372	F005	H-3	A	0.055
Medical (Non-Federal) -- Laboratory	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	In-vitro diagnostic testing	Absorbed Liquid	Xylene, Toluene	26.223	F003, F005	H-3	A	0.000
Academic >20,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Absorbed liquid	Toluene	1.147	F005	H-3	A	0
Industrial -- Research and Development -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Biotechnology R&D, 125I, 32P, 35S, 51Cr	Absorbed liquid	Xylene	0.528	F003	Major nuclides are the following: U-235, U-239, P-32, Zn-65, Ni-59, Bi-207, Ni-63, Mn-54, Sr-90, Fe-59, Cs-137, Ba-133, Cs-134, Ca-45, Co-60, Rb-86, S-35, C0-47, I-125, Co-57, Cr-51, Pm-147, Na-22, Tc-99, C-136	A	1
Academic >20,000 students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Lab counting procedures	Absorbed liquid	Toluene	0.631	F005	H-3, C-14, I-125	A	1
Academic <10,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Absorbed liquid	1,2,4-Trimethybenzene	0.084	F005	H3	A	0.001
Academic >20,000 students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Absorbed liquid	Toluene	0.956	F005	C-14, P-32, S-35	A	0
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Other isotopes small volume lab experiments for counting	Absorbed Liquid	Toluene	0.745	F005	P-32, S-35	A	0.100

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Government -- State	Liquids Scintillation, containing C-14 and/or H-3 -- (fluids or vials) - Flammable	Scintillation cocktail	Aqueous	Toluene, xylene	0.067	F005, F003			
Medical (non-federal) Medical college/hospital -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting practices	Aqueous	Toluene, xylene	12.690	F005, F003	H-3, C-14	A	54.014
Industrial -- Decontamination facility & waste reduction -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Aqueous	Emulsifier and Fluors	1.120	F003	H-3	A	14.340
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Sample counting	Aqueous	Xylene, Toluene	2.486	F003, F005	H-3	A	12.050
Government -- Federal (Research & Development) -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Radioanalysis waste	Aqueous	Scintillation fluids	2.061	U220	C-14, H-3, I-125, P 32, Rb-86, S-35, Co-47, Cr-51, Na-24	A	7.237
Industrial -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures, waste from research	Aqueous	Non-halogenated solvents	0.035	F003	H-3, C-14	A	5
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Tissue solubilizes. Laboratory counting	Aqueous	Toluene	0.698	F005	H-3, C-14	A	1.200
Medical (Non-Federal) -- Hospital 250-750 beds -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Aqueous	Toluene	7.372	F005	H-3, C-14	A	0.900
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation fluids and gel wastes	Aqueous	Toluene, Xylene	1.396	F005, F003	C-14, H-3	A	0.120
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures. Scintillation fluids.	Aqueous	Xylene	2.141	F003	C-14	A	0.010

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	Aqueous	Xylene	0.264	F003	H-3, C-14, P-32, S-35	A	0.000
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biological experimentation	Aqueous	Toluene, xylene	0.021	F005,F003	H-3, C-14	A	0
Medical (Non-Federal) -- Research -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Human white cells are labeled with H-3 Thymidine	Aqueous	Toluene	0.116	F005	H-3	A	0.000
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Laboratory counting procedures	Aqueous	Ignitability	60.083	D001	H-3, C-14	A	3.000
Medical (non-federal) Medical college/hospital -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting practices	Aqueous	Toluene, xylene	27.634	F005, F003	H-3, C-14, S-35, I-125	A	117.763
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Waste from research (other)	Aqueous	Toluene	3.156	F005	H-3, C-14, P-32, S-35	A	18.4
Industrial -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Lab counting procedures, waste from research	Aqueous	Non-halogenated solvents	0.035	F003	Cd-104, Ag-110m	A	1
Industrial -- Decontamination facility & waste reduction -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Aqueous	Emulsifier and Fluors	1.120	F003	H-3	A	14.340
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Aqueous	Xylene, Toluene	2.402	F003, F005	I-125	A	1.000

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (50-200 employees on site) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Lab counting procedures from test kits	Aqueous	Sodium Azide	0.465	P105	I-125	A	0.500
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Scintillation	Aqueous	Toluene, Xylene	1.396	F005, F003	I-125, P-32, S-35	A	0.050
Industrial -- Research and Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Safety surveys / scintillation counting in R&D	Aqueous	Toluene	0.264	F005	P-32	A	0.019
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Lab counting procedures. Scintillation fluids.	Aqueous	Xylene	2.141	F003	H-3, S-35	A	0.010
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Flammable	Laboratory counting procedures	Aqueous	Ignitability	184.507	D001	I-125, P-32	A	9.000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or H-3 (fluids or vials) -- Toxic	Laboratory counting procedures, waste from research	Bulk	Xylene	2.748	F003	H-3, C-14	A	70
Medical (Non-Federal -- Medical college/hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Spent Non-Halogenated Solvents	Bulk	Toluene	1.820	F005	H-3, C-14	A	14.100
Government -- Federal (hospital)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	HPLC counting - Research	Bulk	Toluene	22.296	F005	C-14, H-3	A	10.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk	Xylene	0.172	F003	H-3, C-14	A	0.5
Medical (Non-Federal -- Medical college/hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Spent Non-Halogenated Solvents	Bulk		1.820	F005			
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and H-3 (fluids or vials) -- Toxic	Laboratory counting procedures, waste from research	Bulk	Xylene	24.729	F003	P-32, S-35, I-125, Cr-51	A	650

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Bulk	Xylene	0.191	F003	P-32	A	2
Medical (Non-Federal -- Medical college/hospital	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk	Toluene	1.730	F005	I-125, P-32, Cr-51, Na-22	A	17.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)		Bulk liquid	1, 2, 4-trimethyl-benzene	0.029	D001			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing radioisotopes other than C-14 and / or tritium -- (fluids or vials)	Lab analysis	Bulk liquid	Toluene	0.087	F005	Co-60, Cs-137, H-3		0.000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or H-3 -- (fluids or vials) - Flammable (Absorbed)	laboratory counting procedures	Bulk liquid	Toluene	1.249	F005	H-3, C-14	A	7
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Aquasol-2 scintillation cocktail	Bulk liquid	Xylene	0.084	F003	H-3, C-14	A	1500
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Activities from research laboratories	Bulk liquid	Ignitable	0.316	D001	H-3, C-14	A	70
Industrial -- Manufacturing (<50 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk Liquid	Flammable Liquid	49.675	D001, F002, F003, F005	C-14	A	70.000
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk liquid	Toluene	0.191	F005	C-14, H-3		60
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures. Research	Bulk liquid	Xylene, toluene	7.186	F003, F005	H-3, C-14	A	60
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Bulk liquid	Toluene	1.683	F005	H-3, C-14	A	56
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation counting	Bulk liquid	Xylene	1.683	F003	H-3, C-14	A	56

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Bulk liquid	Toluene	11.995	F005	H-3, C-14	A	25.25
Government: -- Federal (hospital) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Bulk Liquid	Toluene, Xylene	1.746	F003, F005	H-3, C-14	A	20.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	Bulk liquid		0.551	F005, F003, F001	H-3, C-14	A	17.1
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Bulk liquid	Toluene	3.156		H-3, C-14	A	15
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation cocktail, solvent	Bulk liquid	Xylene	0.167	F003	H-3, C-14	A	11.8
Industrial -- Decontamination facility & waste reduction -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Metabolism studies; smear (wipe)test program	Bulk liquid	Flammable liquid	7.651	D001		A	10.842
Academic (<10,000 students)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biological Research. Liquid Scintillation	Bulk liquid	Xylene, toluene	0.287		H-3, C14	A	10
Industrial -- Research and Development -- Conditionally exempt small quantity generator (>100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab. counting procedures	Bulk liquid	Toluene	0.352	F005		A	10
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk Liquid	Toluene	0.860	F005	H3, C14	A	10
Industrial -- Sealed Source/Gauge/Instrument User	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Spent reagents, LSC counting procedures	Bulk Liquid	Toluene, Xylene	4.189	F005, F003	C-14, H-3		9.000
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research/teaching	Bulk liquid	Xylene	0.094	F003	H-3, C-14	A	7
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research activity	Bulk liquid	Toluene, xylene	1.911	F003, F005	H-3, C-14	A	6.75

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research laboratories	Bulk Liquid	Xylene, Methanol	18.851	F003	H-3, C-14	A	6.550
Industrial -- Research and Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research and development tracer studies, labeling studies,	Bulk liquid	Toluene, xylene	1.407	F005, F003	C-14, H-3	A	6
Government -- Federal (Research & Development) -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures, waste from research	Bulk liquid	Toluene	0.003	F005	H-3, C-14	A	5
Industrial -- Research & Development -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biological research - LS counting of C-14 / H-3	Bulk Liquid	Toluene	2.793	F005	H-3, C-14	A	4.500
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Use cocktail, xylene/pseudocumene (trimethylbenzene) mixture	Bulk liquid	Xylene, pseudocumene	0.258	F003	H-3	A	2
Government -- Federal (Hospital) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research use	Bulk liquid	Toluene	1.030	U220	H-3	A	2
Academic >20,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting procedures	Bulk liquid	Toluene, xylene	5.428	F003, F005	H-3, C-14	A	1.5
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting fluid vials	Bulk liquid	Toluene	0.316	F005	H-3, C-14	A	1
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory procedures	Bulk liquid	Xylene, toluene	0.631	F003, F005	H-3, C-14	A	0.5
Medical (Non-Federal) -- Research	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures, spent reagents	Bulk Liquid	Xylene, Methylene Chloride, Toluene	0.365	F003, F005	H-3	A	0.400
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory research counting procedure	Bulk Liquid	Toluene	2.234	F005	H-3	A	0.150
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting - liquid scintillation media meeting,	Bulk liquid	Toluene	0.031	F005	H-3, C-14	A	0.1

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Research -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk Liquid	Trimethylbenzene	0.233	F003	H-3, Cr-51	A	0.063
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	14-C Research/Teaching - Wipe Tests	Bulk liquid	Toluene	0.001	F005	H-3, C-14		0.05
Industrial -- Research & Development -- Small quantity generator (<100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Toxicity testing in laboratory animals, lab counting procedures	Bulk Liquid	Toluene, Xylene	4.468	F005, F003	H-3	A	0.035
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation counting	Bulk Liquid	1,2,4-Trimethylbenzene, P-xylene, other solvents.	3.491	D001	H-3, C-14	A	0.022
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab Counting Procedures	Bulk liquid	Toluene	0.088	F005	C-14	A	0.01
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk Liquid	Toluene	0.698	F005	H-3	A	0.010
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk Liquid	Xylene	0.698	F003	H-3	A	0.007
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk liquid	Ultrafluor high sol 10 (naphtha)	0.025	D001	H-3	A	0.004
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Spent is cocktail	Bulk liquid	Xylene, toluene	0.050	F003, F005	H-3	A	0.004
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	14C/3H counting cocktails from research. Toluene cocktail	Bulk liquid	Ignitability	0.260	D001	C-14	A	0.003

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting procedure	Bulk liquid	LSV	50.294	F005, F003	H-3, C-14	A	0
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Bulk Liquid	Ignitability	5.586	D001	H-3, C-14	A	0.000
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk liquid	Toluene	0.025	F005	C-14		0
Medical (Non-Federal) -- Hospital <250 beds -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research laboratory counting procedures	Bulk Liquid	Toluene, Xylene	3.880	F005, F003	H-3, C-14	A	0.000
Academic <10,000 students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Teaching lab experiments.	Bulk liquid	Toluene	0.004	F005	H3	A	0
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research. Commercial liquid scintillation solution.	Bulk Liquid	Ignitable	0.093	D001	H-3, C-14	A	0.000
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab experiments	Bulk liquid	Liquid scintillation	0.001				
Medical (Non-Federal) -- Research -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk Liquid	Isopropanol	0.233	F005			
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation media	Bulk Liquid	Xylene	0.008	F003			
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research using liquid scintillation counters	Bulk liquid	Toluene, acetone	0.333	F003, F005			
Industrial -- Manufacturing (>200 employees on site)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	Bulk Liquid	Xylene	1.769	F003	H-3, C-14	A	0.500

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Laboratory counting procedures	Bulk liquid	Methanol, toluene, xylene, ethyl ether, 1, 1, 1-trichloroethane, carbon, tetrachloride	3.342	F003, F005, F002, F001	H-3, C-14	A	24.875
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Academic research laboratory counting procedures	Bulk Liquid	Xylene	0.268	F003	H-3, C-14	A	3.5
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Laboratory counting procedures	Bulk liquid	Xylene, Toluene	0.726	F003, F005	H-3, C-14	A	0.839
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Laboratory counting procedures	Bulk liquid	Toluene, xylene	0.287	F005, F003	H-3, C-14	A	0.0224
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing isotopes other than C-14 and H-3 -- (fluid or vials)	Scintillation fluids	Bulk liquid	Waste flammable liquid N.O.S.	0.116	D001	Co-60, Co-58, Cs-137		0.001
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and H-3 -- (fluids or vials) -- Flammable	Laboratory counting procedures	Bulk liquid	Toluene	1.249	F005	I-125, Na-22, P-32, S-35, C-136	A	0.68
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Lab counting procedures	Bulk liquid	Xylene, toluene	5.733	F003, F005	H-3, C-14, S-35, Ca-45	A	30
Academic <10,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Waste from research activity	Bulk liquid	Toluene, xylene	1.796	F003, F005	P-32, S-35, I-125	A	25.53
Industrial -- Research and Development -- Conditionally exempt small quantity generator (>100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Lab counting procedures	Bulk liquid	Toluene	0.528	F005		A	20
Government -- Federal (Research & Development) -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Lab counting procedures, waste from research	Bulk liquid	Toluene	0.017	F005	I-125	A	10

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Waste from research	Bulk liquid		0.707	F005, F003, F001	Others	A	8.3
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Bulk Liquid	Toluene	0.153	F005	S35, I125	A	7.5
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research/ teaching	Bulk liquid	Xylene	0.094	F007	S-35	A	7
Medical (non-federal) Medical (non-federal) Medical college/hospital -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research	Bulk liquid		1.720	F005	H-3, C-14, P-32, Sr 89, Sr-90	A	7
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Liquid scintillation counting	Bulk liquid	Toluene	1.263		C-136, Na-22	A	3
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	32-P - Monitoring - wipe tests	Bulk liquid	Toluene	0.000	F005	P-32		0.5
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Bulk liquid	Xylene, toluene	0.631	F003, F005	H-3, C-14, Ca-45, I-125	A	0.5
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Liquid scintillation media	Bulk liquid	Toluene	0.092	F005	P-32, I-125, S-35	A	0.4
Academic 10,000 to 20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Scintillation vials from surveys	Bulk liquid	Waste, flammable	0.287	F005	H-3	A	0.2
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research	Bulk liquid	Toluene	0.168	F005	P-32, S-35	A	0.113
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Scintillation counting	Bulk liquid	Xylene	0.168	F003	P-32, S-35	A	0.113

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory research	Bulk liquid	Toluene	0.316	F005	S-35, I-125, Ca-45, Fe-59	A	0.0232
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting, liquid scintillation media meeting, EPA hazard standards was banned from use Nov. 1, 1990 this campus; stored for decay	Bulk liquid	Xylene	0.023	F003			
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials) -- contains P-32	Laboratory counting procedures	Bulk liquid	Toluene	0.001	F005	P-32		0
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials) -- Contains S-35	Scintillation Fluid	Bulk liquid	Toluene	0.0004	F005	S-35		0
Industrial -- Research & Development -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Biological research - LS counting of P-32 / S-35	Bulk Liquid	Toluene	2.095	F005	P-32, S-35	A	10.500
Government: -- Federal (hospital) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Bulk Liquid	Toluene, Xylene	0.582	F003, F005	H-3, C-14, Na-22, Ca-45, P-32, S-35	A	3.000
Medical (Non-Federal) -- Hospital <250 beds -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Research laboratory counting procedures	Bulk Liquid	Toluene, Xylene	3.880	F005, F003	S-35	A	0.000
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Waste from research. Commercial liquid scintillation solution.	Bulk Liquid	Ignitable	0.047	D001	Na-22, C-136	A	0.000
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Laboratory counting procedures	Bulk liquid	Xylene, Toluene	1.017	F003, F005	H-3, C-14, Ni-63	A	2.277

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Academic research laboratory counting procedures	Bulk Liquid	Xylene	0.096	F003	S-35	A	0.3
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Laboratory counting procedures	Bulk liquid	Toluene, xylene	0.057	F005, F003	P-32	A	0.01
Medical (non-Federal) --Research - Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulk liquid (vials)	Toluene/xylene	30.618	F003, F005	H-3, C-14	A	22.1
Medical (non-Federal) --Research - Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Bulk liquid (vials)	Toluene/xylene	2.525	F005, F003	P-32, S-35, I-125	A	11.9
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	General research studies	Bulk liquid in vials	Toluene, xylene	0.631	F005, F003	H-3, C-14	A	0
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures - liquid scintillation counting	Bulk LS Vials	Spent toluene mixture, spent xylene mixture	1.052	F005, F003	H-3, C-14	A	0.56
Medical (non-federal) - Medical college/hospital -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Medical research	Bulk/ vials	Toluene Xylene	18.920	F003, F005	H-3, C-14	A	31.9
Medical (non-federal) - Medical college/hospital -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Medical research	Bulk/ vials	Toluene, Xylene	2.867	F003, F005	Ca-45, P-32, S-35, Na-22	A	2.2
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Bulked vials	Toluene, xylene	0.287	F005, F003	H-3, C-14	A	0.002
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Bulked vials	Toluene, xylene, pseudocumene	0.573	F005, F003, U055	H-3, C-14, P-32, S-35, Rb-86	A	3.07

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Cock- tail vials	Fluids or vials	4.513	D001, F005	H-3, C-14	A	2
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Cock- tail vials	Fluids or vials	0.106	D001, F005	S-35, C-136	A	0.03
Industrial -- Manufacturing (50-200 employees on site) -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Fluids or vials	Toluene	3.518	F005	H-3	A	20
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting -- bioresearch	Fluids/ vials	Toluene, xylene	6.593	F003, F005	H-3, C-14	A	4.1586
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Liquid scintillation counting -- bioresearch	Fluids/ vials	Toluene, xylene	0.287	F003, F005			
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Containing isotopes other than 14C and 3H - laboratory research	Liq. scint. fluid		1.999	D001, F003, F005	H-3, C-14, S-35, I-125	A	0.025
Industrial -- Commercial radiopharmacy -- Large quantity generator (>1,000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation media for lab counting procedures	Liquid	Xylene, Methanol, Toluene	41.226	F003, F005, D001	H-3, C-14	A	22.900
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Chemistry analysis	Liquid	Liquid scintillation	0.029	F003	H-3, C-14	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory measurements	Liquid	Scintillation cocktail	0.002	F003	H-3, C-14	A	0.000
Government -- Federal	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Chemical laboratory	Liquid	Liquid Scintillation	0.034	F003			
Government -- State -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or H-3 -- (fluids or vials) - Flammable	Analytical samples (water) and standards	Liquid	Ignitability	0.104	D001	H-3, C-14	A	0

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or H-3 -- (fluids or vials) - Flammable	Liquid scintillation counting, organic, hazardous waste	Liquid	Toluene	3.121	F005			
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	Liquid	LSC	2.111	F003, F005	H-3, C-14	A	2,500.000
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Liquid scintillation cocktail (Benzene)	29.688	F003, F005, D018	H-3, C-14, S-35	A	270
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Waste toluene	40.020	F003	H-3, C-14	A	260.1
Academic -- <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	H-3 and C-14 - molecular biological research	Liquid	Liquid Scintillation Fluid	2.095	F005	H-3, C-14, S-35	A	125.000
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Wipe tests and laboratory counting	Liquid	Toluene, Xylene	4.485	F005, F003	H-3, C-14	A	89.250
Academic >20,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research laboratories	Liquid	Toluene, xylene	6.593	F005, F003	H-3, C-14, P-32, S-35, I-125, Na-22, Rb-86, C-136	A	82.753
Academic (<10,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Medical Research	Liquid	Toluene, xylene	17.487	F005, F003	H-3, C-14	A	62.736
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures (fluids or vials)	Liquid	Toluene	2.920	F005	H-3, C-14	A	61.8
Academic >20,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid Scintillation vials	Liquid	Toluene, xylene	66.602	F005, F003	H-3, C-14	A	58.8
Medical (Non-Federal) -- Research -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Ignitable	2.910	D001	H-3, C-14	A	50.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Vials (945 CU FT shipped during 1990	Liquid		36.120	F005, F003	H-3, C-14	A	50

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Assays (biological, chemical, immunological in vitro)	Liquid	Scintillation Fluid	1.862	F003	H-3	A	25.000
Industrial -- Manufacturing (<50 employees on site) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Xylene	1.396	F003	H-3	A	20.000
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation analysis	Liquid	Xylene, Methanol, Toluene	13.266	F003, F005	H-3, C-14	A	15.310
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting procedures	Liquid	Toluene, xylene	25.990	F005, F003	H-3, C-14	A	13.114
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Liquid	Scintillation cocktails	0.210	D001	H-3, C-14	A	12
Government -- Federal (Hospital) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biomedical research in laboratories	Liquid	Toluene, xylene	2.198	F005, F003	H-3, C14, P32, S-35	A	11.912
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research or remediation of EPA Superfund site.	Liquid	Toluene, xylene	1.720	F003, F005	C-14, H-3	A	10
Industrial -- Research & Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	DNA, monoclonal antibody labelling, probes, etc.	Liquid	Xylene, Toluene	18.618	F005, F003	H-3, C-14	A	10.000
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid	Toluene	2.026	F005	C-14, H-3	A	8.916
Medical (non-Federal) --Research - Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Use of Old Scintillation	Liquid	Toluene, xylene	10.607	F003, F005	C-14, H-3	A	7.61
Academic 10,000-20,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Aquasol, liquid scintillation fluid	0.989		H-3, C-14	A	7.314

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (<50 employees on site) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Flammables	4.573	F003, F005	H-3, C-14	A	6.918
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research laboratory counting procedures cleaning of laboratory equipment	Liquid	Toluene	7.639	F005	H-3, C-14	A	6.141
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	From research and teaching laboratories	Liquid	Toluene	2.841	F005	H-3, C-14, P-32, S-35, I-125	A	5.678
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	LSC Counting	Liquid	Methanol, Acetonitrile, Benzene, Acetone, Ethyl Acetate, Diethyl Ether, Toluene, Dichloromethane, Hexane, Pentane, Tetrahydrofuran	8.442	F003, U003, F005, F003, U080, U213	C-14	A	5.000
Industrial -- Research and Development -- Conditionally exempt small quantity generator (>100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation fluids	Liquid	Toluene	1.319	F005		A	4.983
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting procedures	Liquid	Toluene, xylene	3.478	F005, F003	H-3, C-14	A	4.05
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	From toxicology research	Liquid	Toluene	3.785	F005	C-14	A	4.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research, lab counting procedures, cleaning, decontamination, etc.	Liquid	Ignitable, toluene, xylene	2.580	F005, F003	H-3, C-14	A	3.98
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation fluid components	Liquid	Toluene, xylene	3.091	F005, F003	H-3, C-14	A	3.66

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Government -- State -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation counting	Liquid	Xylene	5.667	F003	H-3, C-14	A	3.63
Medical (Non-Federal) -- Medical College/Hospital -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid	Toluene, Xylene	0.776	F005, F003	H-3, C-14	A	3.400
Medical (Non-Federal) -- Medical College/Hospital -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting	Liquid	Toluene, Xylene	0.013	F005, F003	H-3, C-14	A	3.319
Medical (Non-Federal) -- Medical College/Hospital -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research, LSC counting	Liquid	Toluene	2.037	F005	H-3, C-14	A	3.300
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting - education - 3H and 14C	Liquid		0.021	D001	H-3, C-14	A	3
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures and radiation safety surveys	Liquid	Toluene, Xylene	3.950	F005, F003	C-14, H-3	A	2.592
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biology counting procedures	Liquid	Toluene, xylene	0.473	F003, F005	H-3, C-14, P-32, S-35, I-125	A	2.35
Industrial -- Manufacturing (50-200 employees on site) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Diagnostic QC	Liquid	Toluene	0.528	F005	H-3	A	2.000
Industrial -- Research & Development -- Small quantity generator (<100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Toluene, Sodium Azide	7.634	F005, P105	H-3	A	1.690
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Liquid	Toluene	2.536	F005	H-3, C-14	A	1.3
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	11.5 cu ft -- Laboratory counting procedures	Liquid	Toluene, xylene	0.440	F005, F003	H-3, C-14	A	1.123

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Quantities of C-14	Liquid	Toluene	0.011	F005	C-14	A	1.000
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Education and research experiments	Liquid	Toluene	0.191	F005	C-14, H-3		1
Government -- Federal (hospital)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Medical research. In-vitro diagnostic testing	Liquid	Toluene	1.164	F005	H-3, C-14	A	1.000
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Liquid	Toluene	0.947	F005	H-3, C-14	A	0.756
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from Research	Liquid	Xylene, toluene	0.137	F003, F005	H-3, C-14	A	0.551
Industrial -- Research & Development -- Small quantity generator (<100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)		Liquid	Isoamylalc, Toluene	0.698	F005, D001	H-3	A	0.540
Medical (Non-Federal) -- Hospital 250-750 beds -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Toluene/Xylene	1.164	F003, F005	H-3, C-14	A	0.521
Medical (Non-Federal): -- Hospital >750 beds -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation fluids	Liquid	Xylene	0.155	F003	H-3, C-14	A	0.510
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid	Toluene, xylene	0.126	F005, F003	H-3, C-14	A	0.5
Medical (non-Federal) Hospital (250-750 beds) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory procedures	Liquid	Toluene	0.287	F005	H-3	A	0.5
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research and counting	Liquid	Toluene	0.253	F005	H-3, C-14, S-35	A	0.453

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Hospital >750 beds -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Liquid	Toluene	1.824	F005	H-3, C-14	A	0.410
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory research practices	Liquid	Xylene	1.561	U239	H-3, C-14	A	0.4
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research and development	Liquid	Xylene	2.793	F003	C-14	A	0.357
Academic 10,000-20,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory instruction and research	Liquid	Toluene	0.011	F005	H-3, C-14	A	0.3
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation fluids.	Liquid	Xylene, Toluene	0.186	F003, F005	H-3, C-14		0.250
Industrial -- Research & Development -- Small quantity generator (<100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)		Liquid	Toluene	1.396	F005	H-3	A	0.160
Industrial -- Manufacturing (<50 employees on site) -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Primary constituent	Liquid	Toluene	0.035	F005		A	0.1
Medical (Non-Federal) -- Research	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Toluene	0.291	F005	H-3, C-14, S-35, P-32	C	0.100
Academic >20,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research.	Liquid	Pseudocumene	0.382	D001	H-3, C-14, S-35	A	0.1
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biological research	Liquid	Toluene	0.084	F005	H-3, C-14	A	0.06
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Process research	Liquid	Xylene	0.017	F003	H-3, C-14	A	0.04

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Hospital 250-750 beds	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedure	Liquid	Toluene	0.291	F005	H-3, C-14		0.040
Industrial -- Research and Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research and development	Liquid	Toluene	0.528	F005	C-14	A	0.040
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	3H and 14C counting procedures on research materials	Liquid	Toluene	0.084	F005	H-3, C-14	A	0.02
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab waste from teaching and research	Liquid	Non halogenated solvent	0.084	F003, F005	H-3, C-14	A	0.02
Academic 10,000-20,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid	Xylene	0.096	F003	C-14	A	0.016
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Containing C-14 Label	Liquid	Benz(A)anthracene, benzo(A)pyrene	0.071	U018, U022	C-14		0.005
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab Assay	Liquid	Toluene	0.007	F005	H-3, C-14	A	0.003
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting samples experimental C14/H3 productivity samples	Liquid	Toluene, xylene	1.871	F003, F005	H-3, C-14	A	0
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Liquid	Toluene, xylene	0.516	F005, F003	C-14, H-3	A	0
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Liquid	Toluene	0.145	F005	H-3, C-14	A	0
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting	Liquid	Toluene, Xylene	1.396	F005, F003	H-3, C-14	A	0.000
Government -- State -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Toluene, xylene	0.010	F003, F005	H-3, C-14	A	0

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (>200 employees) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Toluene, Xylene	0.264	F005, F003	H-3, C-14, P-32, S-35	A	0.000
Academic 10,000-20,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Liquid	Xylene, toluene	0.071	F005, F003	H-3, C-14	A	0
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting of laboratory samples	Liquid	Toluene, Xylene	0.528	F005, F003	H-3, C-14	A	0.000
Medical (non-federal) - Medical college/hospital -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid	Scintillation fluid	1.473	D001	H-3, C-14	A	0
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid		0.007		H-3, C-14		0
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Sample preparation and analysis	Liquid	**	2.793	F002, F003	C-14	A	0.000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Tissue oxidizer, HPLC counting	Liquid	Toluene, ignitability	1.665	F005, D001			0
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from lab counting procedures	Liquid	Xylene, toluene	0.505	F005, F003	H-3, C-14	A	0
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting procedure	Liquid		0.253	D001			
Medical (Non-Federal) -- Hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Liquid		0.608		H-3, C-14		
Medical (Non-Federal) -- Medical College/Hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedure	Liquid		9.009				

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Toluene	0.004	F005			
Medical (Non-Federal) -- Medical college/hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid		4.695				
Medical (Non-Federal) -- Medical college/hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid		0.287				
Medical (Non-Federal) -- Medical college/hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid		3.783				
Medical (Non-Federal) -- Hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Liquid		1.164		H-3, C-14, I-125, I-131, S-35, P-32		
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Physiological and biochemical experiments	Liquid	Toluene	0.084	F005			
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Deregulated Liquid Scintillation Vials	Laboratory counting procedures. Liquid scintillation fluid	Liquid	Waste flammable liquid	4.013	D001	H-3, C-14	A	14
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Research waste	Liquid	Scintillation Fluid	133.373	D001, F001, F003, F005	H-3, C-14	A	25.970
Medical (Non-Federal) -- Research -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- flammable	Counting samples	Liquid	Liquid Scintillations	1.552	F005	H-3, C-14	A	12.880
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Laboratory counting procedures	Liquid	Characteristic	0.025	D001	H-3, C-14	A	0.016
Medical (Non-Federal) -- Hospital >750 beds -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- flammable	Patient diagnostic procedures, laboratory counting procedures, biomedical research, equipment quality control	Liquid	Xylene	0.155	F003	H-3	A	0.002

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Research	Liquid		0.352	D001, F003	H-3, C-14	A	0
Industrial -- Research & Development (not-for-profit research & development lab) -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Waste from TCLP, oxidation and counting procedures	Liquid	Xylene, Methanol, Toluene	0.698	F003, F005	C-14, H-3		0.000
Academic >20,000 students -- No EPA Classification	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Waste from research, lab counting procedures, decontamination	Liquid	Xylene, toluene	22.799	F003, F005	H-3, C-14	A	201.9337
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Laboratory counting procedures	Liquid	Xylene, toluene	0.537	F003, F005	H-3, C-14	A	1.576
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Waste from research	Liquid	Toluene, xylene	2.525	F005, F003	H-3, C-14	A	0.52
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	LSC, C14/H3	Liquid	Toluene	0.229	F005	H-3, C-14	A	0
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Waste toluene	21.548	F003	H-3, C-14, S-35,P-32, I-125	A	295.4
Academic >20,000 students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Liquid scintillation vials	Liquid	Toluene, xylene	17.045	F003, F005	Ca-45, C-136, Cr-51, I-125, I-131, In 111, Na-22, P-32, Rb-82, Rb-86, S-35, Sc-46	A	65.3
Academic 10,000-20,000 Students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Aquasol liquid scintillation fluid	0.821		H-3, C-14, Ca-45	A	17.149
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Physiological and biochemical experiments	Liquid	Toluene	0.084	F005	P-32	A	15
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Counting procedures	Liquid	Toluene, xylene	3.713	F005, F003	P-32, S-35, Ca-45, Rb-86	A	8.713

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Scintillation counting media from research	Liquid	Toluene, xylene	0.307	F005, F003	H-3, I-125, Na-22, S-35, P-32	A	7
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Waste from research, lab counting procedures, cleaning, decontamination, etc.	Liquid	Ignitable, toluene, xylene	0.573	F005, F003	P-32, S-35, C-136	A	4.98
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures and radiation safety surveys	Liquid	Toluene, xylene	2.988	F005, F003	P-32, S-35, I-125, Ca-45	A	4.426
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Counting procedures	Liquid	Xylene	3.478	F003	H-3, P-32, S-35	A	2.97
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research	Liquid	Toluene	0.573	F005	C-14, H-3, P-32	A	1.803
Academic 10,000-20,000 Students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research	Liquid	Xylene	0.096	F003	S-35	A	1.5
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Lab counting procedures	Liquid	Toluene	2.536	F005	P-32, S-35	A	1.3
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Biology counting procedures	Liquid	Toluene, xylene	0.473	F003, F005	H-3, C-14, P-32	A	0.85
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research	Liquid	Toluene, xylene	0.042	F005, F003	P-32, Ca-45	A	0.5
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	7.5 cu ft -- laboratory counting procedures	Liquid	Toluene, xylene	0.287	F005, F003	Ca-45	A	0.437
Academic 10,000-20,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory instruction and research	Liquid	Toluene	0.004	F005	S-35	A	0.1

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (<50 employees on site) -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Primary constituent	Liquid	Toluene	0.035	F005		A	0.1
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Waste from research laboratory counting procedures cleaning of laboratory equipment	Liquid	Toluene	0.631	F005	Na-22, S-35, C-136, Ca-45, I-125	A	0.058
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Liquid scintillation counting	Liquid	Toluene, xylene	0.287	F003, F005	S-35, I-125	A	0.05
Government -- State -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Scintillation counting	Liquid	Xylene	0.258	F003	H-3, C-14, S-35	A	0.04
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	32P and 35S counting procedures on research materials	Liquid	Toluene	0.042	F005	P-32, S-35	A	0.007
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Waste from Research	Liquid	Xylene, toluene	0.137	F003, F005	S-35, Ca-45	A	0.005
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Lab counting procedures	Liquid	Toluene, xylene	0.344	F005, F003	P-32. S-35	A	0
Academic 10,000-20,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Liquid scintillation counting	Liquid	Xylene, toluene, naphthalene, dioxane	0.071	F005, F003, U165, U108	P-32, I-125, S-35, Cr-51	A	0
Government -- Federal (Hospital) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Biomedical research in laboratories	Liquid	Toluene, xylene	1.030	F005, F003			
Academic >20,000 students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research laboratories	Liquid	Toluene, xylene	45.293	F005, F003			
Academic 10,000-20,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research laboratory counting procedures	Liquid		0.042	D001			

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Tissue oxidizer, HPLC counting	Liquid	Toluene, ignitability	1.665	F005, D001			
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials) - Regulated liquid	Laboratory counting procedures	Liquid	Waste flammable liquid	2.867	D001	H-3, C-14, P-32, S-35, I-125, Cr-51, Na-22, C-136, Ca-45	A	52
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials) -- Flammable	Research	Liquid		0.354	D001, F003	P-32	A	0
Academic <10,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials) -- S-35	Lab counting procedures	Liquid	Toluene	0.072	F005	S-35	A	0
Industrial -- Manufacturing (>200 employees) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Toluene, Xylene	0.264	F005, F003	Am-241	A	6,000.000
Medical (Non-Federal) -- Medical College/Hospital -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Research	Liquid	Toluene, Xylene	31.971	F005, F003	H-3, C-14, P-32, S-35, I-125, Ca-45	A	139.400
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Liquid scintillation analysis	Liquid	Xylene, Methanol, Toluene	6.982	F003, F005	H-3, C-14, P-32, Ca-45, Rb-86, I-125, S-35	A	112.110
Medical (Non-Federal) -- Research -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Ignitable	5.238	D001	I-125, P-32, S-35	A	100.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)		Liquid	Toluene	2.111	F005	P-32, S-35, H-3	A	70.000
Industrial -- Research & Development	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)		Liquid	Alkylbenzene	0.019	F005	C-14	A	12.100

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Research -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Sent to Quadrax via broker - no drain disposal for biodegradable	Liquid	Toluene	7.415	F005	I-125, P-32, Ca-45, S-35, Cr-51	A	5.900
Industrial -- Research & Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	DNA, monoclonal antibody labelling, probes, etc.	Liquid	Xylene, Toluene	4.655	F005, F003	Cr-51, P-32, I-125	A	5.000
Medical (Non-Federal) -- Medical College/Hospital -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Laboratory counting	Liquid	Toluene, Xylene	0.013	F005, F003	C-14, H-3, P-32, S-35, C-136, Na-22	A	3.006
Industrial -- Research & Development	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Scintillation fluids.	Liquid	Xylene, Toluene	0.186	F003, F005	H-3, P-32		0.500
Government -- Federal (hospital)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Medical research, radiation safety, RIA lab.	Liquid	Toluene, Xylene	2.018	F005, F003	H-3, C-14, P-32, S-35, Rb-86, I-125	A	0.280
Industrial -- Commercial Radiopharmacy -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Scintillation media for lab counting procedures	Liquid	Methanol, Toluene	0.176	F003, F005, D001	Ca-45	A	0.246
Industrial -- Waste broker / processor -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Lab operations	Liquid	LSC Mixture containing Xylene	3.166	D001, F003	H-3, C-14, P-32, S-35, Na-22	A	0.178
Government -- Federal (hospital) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Liquid scintillation fluid	Liquid	Toluene	0.610		S-35	A	0.035
Industrial (not for profit toxicological research institute) -- Conditionally exempt small quantity generator (< 100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid	Pseudocumene	1.583	D001	P-32, S-35		0.000
Medical (Non-Federal) -- Medical college/hospital	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid		0.287				

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Flammable	Laboratory counting procedures	Liquid	Characteristic	0.012	D001	P-32	A	20.500
Medical (Non-Federal) -- Research -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Flammable	Counting samples	Liquid	Liquid Scintillations	0.776	F005	Ca-45	A	13.780
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Flammable	Research waste	Liquid	Scintillation Fluid	4.236	D001, F001, F003, F005	P-32, I-125, S-35	A	0.020
Industrial -- Waste Broker/Processor -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Flammable	Liquid scintillation counting (oil / organic-based samples)	Liquid	Xylene	0.070	F003	H-3, C-14	A	0.000
Industrial -- Research & Development	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Toxic	Scintillation cocktail	Liquid	Methyl Ethyl Ketone	2.793	D035	C-14	A	1.000
Academic >20,000 students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Waste from research, lab counting procedures, decontamination	Liquid	Xylene, toluene	22.780	F003, F005	I-124, P-32, Cr-51, S-35, Ca-45, Cd-109	A	214.44
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Laboratory counting procedures	Liquid	Xylene, toluene	0.316	F003, F005	S-35, P-32	A	0.586
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	LSC, S35	Liquid	Toluene	0.057	F005	S-35	A	0
Academic >20,000 students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation (non-exempt), containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research	Liquid	Toluene	2.007	F005	H-3, C-14, S-35, Ca-45	A	5
Academic (10,000-20,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research laboratory waste	Liquid (vials)	Toluene, xylene, methanol	12.690	F005,F003	C-14, H-3	A	6.6

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic (10,000-20,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research laboratory waste	Liquid (vials)	Toluene, xylene, methanol	8.447	F005,F003	H-3, P-32, S-35, I-125	A	45
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Scintillation Cocktail	Liquid 32P	Xylene	0.063	F003	P-32	A	5
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Counting procedures/ research	Liquid 35S	Toluene	0.084	F005	S35	A	10
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) - S35	Counting procedures/ research	Liquid 3HP	Xylene	0.042	F003	H-3	A	0.75
Academic 10,000-20,000 Students -- Large quantity generator (1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid bulk	Toluene, xylene	0.338	F005, F003	H3	A	0.95
Government -- Federal (hospital) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Below 0.05 NC/G counting-specimen assay H-3, C-14, P-32	Liquid Bulk	Toluene	5.701	F005	H-3, C-14	A	0.730
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation cocktail	Liquid bulk	Pseudocumene	0.416	D001			
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	3H and 14C vials	Liquid in vial	Toluene, xylene	0.042	F005, F003	H-3	A	0.1
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Liquid in Vials	Scintillation solution containing Xylene, Toluene, Pseudocumene or related Hydrocarbons	33.513	F003, F005	C-14	A	43.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid in Vials	Toluene	2.095	F005	H-3, C-14	A	1.000
Academic 10,000-20,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures, commercial scintillation cocktails	Liquid in vials	Scintillation fluids, may contain toluene, xylene, etc.	0.287	F005, F003	H-3, C-14	A	0.2

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (<50 employees on site) -- Small quantity generator (100-1,000	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting	Liquid in Vials	Toluene	0.698	F005	H-3, C-14	A	0.005
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	Liquid in vials	Toluene, xylene	3.788	F005, F003	H-3, C-14	A	0
Medical (Non-Federal) -- Medical College/Hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Liquid in vials		0.030				
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- flammable	Laboratory counting procedures	Liquid in Vials	Xylene, Toluene, Mineral Spirits	2.095	D001, F003, F005	H-3, C-14	A	2.759
Medical (Non-Federal) -- Hospital 250-750 beds	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Lab counting procedures	Liquid in Vials	Xylene	0.155	F003	H-3, C-14	A	0.100
Medical (non-Federal) --Research - Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Basic biomedical research and education	Liquid in vials	Toluene/xylene	2.867	F003, F005	H-3, C-14, Na-22, Ca-45, S-35	A	0.52
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biomedical research	Liquid in vials/ bulk	Liquid scintillation fluids, toluene, xylene	112.620	D001, F005, F003	H-3, C-14	A	52.2
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Biomedical research	Liquid in vials/ bulk	Liquid scintillation fluids, toluene, xylene	93.684	D001, F005, F003	P-32, S-35	A	11.3
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Bulk liquid and scintillation vial contained LSC cocktail containing less than 0.05 microcuries/ML	Liquid Scintilla-tion	Xylene	20.247	F003	C-14	A	43.500
Medical (Non-Federal) -- Hospital 250-750 beds -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Liquid Scintilla-tion	Toluene	5.405	F005	H-3, C-14	A	20.247
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	Liquid Scintilla-tion	Toluene	8.239	F005	H-3, C-14	A	11.000

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Radioisotopic biochemical assays	Liquid Scintillation	Benzo(A)pyrene	0.172	U022	H-3		0.163
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Scintillation vials generated from wipe tests / protein assays	Liquid Scintillation	Toluene	9.076	F005	C-14, H-3	A	158.550
Medical (Non-Federal) -- Medical College/Hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research lab counting	Liquid Scintillation Vials	Toluene, Xylene	18.288	F005, F003	H-3, C-14	A	6.797
Medical (Non-Federal) -- Hospital 250-750 beds	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Liquid Scintillation Vials	Toluene	7.981	F005	H-3, C-14	A	0.007
Medical (Non-Federal) -- Medical College/Hospital	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Radioactive vial other than DE-REG H-3 - C-14, research lab counting procedures	Liquid Scintillation Vials	Toluene, Xylene	24.383	F005, F003	H-3, C-14, P-32, S-35, Cr-51, Fe-59, Ca-45	A	10.221
Medical (Non-Federal) -- Medical College/Hospital -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Medical research	Liquid Scintillation Vials	Toluene, Benzene, Acetone, Methanol, Xylene	36.484	F003, F005	H-3, C-14, Ca-45, I-125, P-32, S-35	A	237.340
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid vials	Toluene, xylene	13.953	F005, F003	H-3, C-14	A	18.99
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting procedures, 14C and 3H	Liquid vials		0.631	F003, F005	H-3, C-14	A	8.9
Academic 10,000-20,000 Students -- Large quantity generator (1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid vials	Toluene, xylene	1.263	F005, F003	C-14	A	1.5815
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting procedures	Liquid vials	Xylene	3.166	F003	H-3	A	0.000
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting	Liquid vials	Scintillation fluids	0.214	D001			

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research	Liquid vials	Toluene, xylene	8.002	F005, F003	P-32, S-35	A	27.62
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Counting procedures, other isotopes	Liquid vials		0.631	F003, F005	H-3, Ca-45, Cr-51	A	8.9
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	C14,3H xylene base laboratory counting procedures pseudocumene base	Liquid/ vials	Xylene	0.780	F003			
Academic >20,000 students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Research	Liquid/ vials	Toluene, xylene	1.578	F005, F003	C-14, H-3, I-125	A	0
Academic <10,000 Students - Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting procedures	Liquids	Toluene	0.631	F005	H-3, C-14	A	20
Academic <10,000 Students - Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Counting procedures	Liquids	Toluene	0.631	F005	P-32, S-35, I-125	A	1
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Bulk liquid and scintillation vial contained LSC cocktail containing less than 0.05 microcuries/ML	Liquid Scintilla-tion	Toluene	20.247	F005	C-14	A	43.500
Medical (Non-Federal) -- Research -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation	LSC	Toluene	0.776	F005	H-3	A	23.000
Industrial	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)		LSC		0.517				
Medical (Non-Federal) -- Research -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Liquid scintillation fluids	LSC	Toluene	0.466	F005	Ca-45	A	4.000
Medical -- Hospital	LSC		LSC w/ I125		0.365				

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Medical College/Hospital -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research waste	LSV	Xylene, Toluene, Ignitable	1.630	D001, F003, F005	H-3, C-14	A	5.000
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	LSV		0.267	D001, F005	H3, C14		0
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	LSV	Toluene/xylene	4.209	F005, F003	H-3, C-14	A	0
Medical (Non-Federal) -- Medical College/Hospital -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- flammable	Waste from research	LSV	Toluene	1.455	F005	H-3, C-14	A	1.785
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Commercial source	LSV	Trimethylbenzene	2.902			A	0.236
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Waste from research	LSV	Toluene/Xylene	3.998	F005, F003			
Medical (Non-Federal) -- Medical College/Hospital -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Research waste	LSV	Xylene, Toluene, Ignitable	1.630	D001, F003, F005	S-35, Ca-45	A	18.000
Medical (Non-Federal) -- Medical College/Hospital -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Flammable	Waste from research	LSV	Toluene	0.873	F005			
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Laboratory counting procedures	LSV's	Toluene, xylene	27.520	F003, F005	H-3, C-14	A	57.4
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Laboratory counting procedures (Isotopes other than H3, C14)	LSV's	Toluene, xylene	4.300	F003, F005	P-32, S-35, Ca-45, I-125	A	10.5
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and H-3 -- (fluids or vials) --	Research generation of the three waste streams listed	Non aqueous fluid	Toluene	0.205	F005	P-32	A	2

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or H-3 -- (fluids or vials) - Flammable	Research generation of the three waste streams listed	Non aqueous liquid	Toluene	1.274	F005	C-14	A	2.075
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials) -- Contains S-35 & P-32	Laboratory counting procedures	Non-aqueous liquid in vials	Toluene	4.485	F005	H-3, C-14, P-32, S-35	A	10.5
Medical (Non-Federal) -- Laboratory -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Mixed lymphocytes culture test	Organic Liquid	Toluene	1.140	F005	H-3	A	0.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Medical, biological, geological research counting procedures	Organic liquid	Toluene, xylene	5.682	F005, F003	C-14, Ca-45, H-3, I-125, P-32, S-35	A	11.877
Medical (Non-Federal) -- Research	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biomedical lab research	Protein Conjugate	Xylene	6.841	U239	H-3, C-14	A	7.500
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures, waste from research	Scintilla-tion	TNT	0.316	D001	C-14	A	0.003
Academic <10,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Small scale biological experiment for teaching	Scintilla-tion fluid	Toluene, Dioxane	0.006	F005, D001	H-3, C-14	C	12.45
Academic <10,000 students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Small scale biological experiment for teaching	Scintilla-tion fluid	Toluene	0.006	F005	P-32, S-35	C	47.5
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biomedical research/lab research (LIQ scint H3/C14 vials)	Scintilla-tion Vials	Biodegradable, toluene, xylene	7.759	F005, F003	H-3, C-14	A	80
Government -- Federal (hospital) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting	Scintilla-tion Vials	Toluene, Xylene	5.701	F005, F003	H-3, C-14	A	15.870
Industrial -- Research and Development -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	Scintilla-tion Vials	Toluene	0.141	F005	H-3	A	1.5

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	All generated from in vitro laboratory experiments only C14 and H3. All are deregulated waste.	Scintillation Vials		0.631		H-3, C-14	A	0.8
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research and development	Scintillation Vials	Toluene, Xylene	8.067	F005, F003	H-3, C-14	A	0.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Biomedical research/lab research (LIQ scint other than H3/C14 vials)	Scintillation Vials	Biodegradable, toluene, xylene	1.949	F005, F003	S-35, P-32, C-136, I-125	A	40
Industrial -- Research & Development	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Research and development	Scintillation Vials	Toluene, Xylene	4.611	F005, F003	P-32, Ca-45, Rb-86	A	2.190
Government -- Federal (hospital) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Laboratory counting	Scintillation Vials	Toluene, Xylene	1.140	F005, F003	S-35, P-32	A	1.610
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Solid	Toluene	2.867	F005	H-3, C-14	A	10
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures	Solid (vials)	Xylene, toluene	1.561	F003, F005	H-3, C-14	A	0.193
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Mixed / dry solid	Solid/ Liquid	Mixed Solid - Dry Solid, Xylene	4.189	F003	H-3, C-14	A	0.000
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation vials	Un-compacted solid	Toluene	0.071	F005	H-3	A	0
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting procedures	Un-absorbed liquid/ vials	Toluene/xylene	1.431		H-3, P-32, S-35	A	3
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation	Un-compacted solid	Toluene	0.038	F005	C-14, H-3		1

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Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (vials)	Counting C14	Un-compacted solids	Toluene	0.191	F005	C-14	A	0.00001
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from medical research	Vial	Xylene	37.458	F003	H-3, C-14	A	5.8
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Waste from medical research	Vial	Xylene	12.486	F003	H-3, C-14, P-32, Na-22	A	2.8
Medical (Non-Federal) -- Research -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Vials	Toluene	13.095	F005	H-3, C-14, P-32	A	83.920
Academic >20,000 students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research and laboratory counting procedures	Vials	Vials	34.094	D001, F003, F005	H-3, C-14	A	67.964
Industrial -- Research and Development -- Large quantity generator(>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Pharmaceutical research. Scintillation vials.	Vials	Xylene	1.759	F003	H-3, C-14	A	30.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Vials - 3H and 14C only	Vials	Toluene, xylene	2.210	F003, F005	H-3, C-14	A	10
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from R & D labs	Vials	Toluene, xylene	1.407	F003, F005	C-14	A	5
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Organic scintillation fluids in vials	Vials	Xylene	2.793	F003	H-3, C-14	A	3.339
Medical (Non-Federal) -- Research -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research	Vials	Toluene	2.037	F005	H-3, C-14	A	2.620
Academic (10,000-20,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab counting procedures	Vials	Xylene, toluene, pseudocumene	0.755	F003, F005, D001	H-3, C-14		0.32

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Hospital >750 beds -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biological research	Vials	Xylene, Toluene	0.310	F003, F005	H-3	A	0.000
Academic 10,000-20,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting procedures	Vials	Toluene	0.105	F005	H-3		0
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Vials - other isotopes	Vials	Toluene, xylene	0.316	F003, F005	P-32	A	10
Academic >20,000 students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Waste from research and laboratory counting procedures	Vials	Vials	7.644	D001, F003, F005	P-32	A	6.2
Academic (10,000-20,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Lab counting procedures	Vials	Xylene, toluene, pseudocumene	1.433	F003, F005,D 001	H-3, C-14, P-32, S-35, Na22	A	0.61
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Laboratory counting procedures	Vials	Xylene, toluene	0.417	F003, F005	P-32	A	0.00002
Industrial -- Research and Development -- Large quantity generator(>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Pharmaceutical research. Scintillation vials.	Vials	Xylene	0.879	F003	S-35, I-125, P-32, Cr-51	A	3.500
Industrial -- Research & Development	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or	Organic scintillation with CA45	Vials	Xylene	0.698	F003	Ca-45	A	2.883
Medical (Non-Federal) -- Research -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Waste from research. Six 55 gallon drums contained other radioisotopes mixed with H-3.	Vials	Toluene	0.291	F005	H-3, S-35, Ca-45	A	0.250
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research sample prep, reagents, and absorbents and plastics	Vials - liquid	Formaldehyde	0.076	D001			
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research activities - sample counting	Vials Liquid	Toluene	110.231	F005	C-14, H-3	A	15.000

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Research activities - sample counting	Vials Liquid	Toluene	17.031	F005	C-14, S-35, I-125	A	5.000
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Counting and research	Vials, absorbent	Xylene	0.287	F003	H-3, C-14	A	0.039
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Counting and research	Vials, absorbent	Xylene	0.287	F003	C-136	A	0.001
Industrial -- Research and Development -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	LS counting of vials in laboratories	Vials/ Liquid	Alkorganino	0.264	D001	C-14	A	0.002
Medical (Non-Federal) -- Medical College/Hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting			11.249				
Medical (Non-Federal) -- Medical College/Hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting			22.802				
Medical (Non-Federal) -- Medical College/Hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting			11.401		H-3, C-14		
Academic >20,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	LSC			42.087				
Government -- Federal (Research & Development)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	LSC			0.766				
Industrial	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	LSC			0.689				
Industrial -- Research and Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	LSC			0.354				
Government -- Federal	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)			LSC	0.156				
Government -- Federal (Research and Development)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)			LSC	3.850				
Government -- Federal (Military)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)			LSC	57.435				

Table A-13. LSC waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)			LSC	0.521				
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Liquid scintillation procedure (counting)		LSC	3.166		C-14	A	6.700
Academic >20,000 students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	LSC with P32, I125, Ca45, S35			21.213		P-32, I-125, CA-45, S-35		
Academic > 20,000 students --	LSC	LSC			1.464				
Industrial	LSC	LSC			0.258				
Industrial	LSC	LSC			0.326				
Industrial	LSC				2.793				
Industrial	LSC				2.756				
Industrial	LSC				0.317				
Industrial -- Commercial Radiopharmacy	LSC				0.689				
Industrial	LSC				0.344				
Industrial	LSC				0.251				
Medical -- Medical College/Hospital	LSC			LSC	1.723				
Medical (non-federal)	LSC				0.058				
Medical (non-federal)	LSC				23.551				
Medical (non-federal)	LSC				0.031				
Industrial	Other (misc.)				0.093				
Academic	Other (Specify) -- LSC			LSC	0.156				
Academic	Other (Specify) -- LSC			LSC	0.156				
Academic	Other (Specify) -- LSC				0.631				
Academic	Other (Specify) -- LSC				1.263				
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Other (Specify) -- LSC				0.631				
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Other (Specify) -- LSC				45.117				
Industrial -- Commercial Radiopharmacy	Other (Specify) -- LSC			LSC	2.638				
Government -- Federal (Research & Development)	Other - LSC	LSC			0.021				

Table A-14. Multi-code waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- NICD Batteries	Maintenance of emergency lighting equipment	Solid / liquid	Corrosive liquid, cadmium	0.145	D002, D006	Co-60, Cs-134, Cs-137		0.000
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Discarded radiochemicals used in research	Liquid - small vials	Various	0.021	D001, F003, F005	H-3, C-14	A	40
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratory research	Un-compacted solid		73.281	D001, D002, D003, F002, F003, F005, U003, U022, U168, U089, U221	H-3, C-14, S-35, P-32, I-125	A	1.3
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filter Media -- Dewatered	Filter bags	Un-compacted solid	Processing used oil / lead / solvent for energy recovery	0.218	D008, F001, F002, F003, F005	Co-60, Cs-137, Cs-134		0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Shielding	Expended penetration shielding	Solid	Lead, acetone, methyl ethyl ketone	0.218	D008, F003, F005	Mn-54, Co-60, Fe-59	A	1.940
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Mixed solvents	Absorbed liquid	Methanol, benzene, chloroform	0.084	D022, F003,	H-3, C-14, Ni-63	A	3173.35
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Aqueous -- Solidified	Decontamination	Liquid	1,1,1-trichloroethane, trichlorofluoroethane, trichlorofluoro-methane, methyl ethyl ketone, toluene	0.654	F001, F002, F005	Co-60, Cs-134, Cs-137, Zn-65	A	0.036
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquid Organic - (Solvents, Chlorinated Solvents, etc.) -- Flammable	Research waste	Liquid	Solvents	0.856	D001, F001, F003, F005	H-3, S-35	A	0.560

Table A-14. Multi-code waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	solvent cleaning bottoms	Bulk liquid	1, 1, 2-trichloro-1, 1, 2-trifluoroethane, 1, 1, 1-trichlorethane, acetone, toluene, cadmium, chromium, lead	0.145	F002, F003, F005, D006, D007, D008	Co-60, Cs-134, Cs-137	A	0.007
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Solvents used in cleaning machine parts, laundry and decontamination	Bulk liquid	Spent halogenated and non-halogenated solvents and chlorofluoro-carbons	21.386	F002, F003			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Solvents used for degreasing	Bulk liquids	1, 1, 2-trichloro-1, 1, 2-trifluoroethane, acetone, flammability, barium, cadmium, chromium, lead	0.058	F001, F003, D001, D005, D006, D007, D008	Co-60, Cs-134, Cs-137	A	0.003
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity reactor (>1000 kg/month)	Liquid organic -- (solvents, chlorinated solvents, etc.)	Cleaning Parts, Tools, etc.	Liquid	Alcohol, acetone, mineral spirits	0.654	U002, F001, F002			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Maintenance activities	Solvent liquid	Ignitable, mercury, barium, lead, chromium, chloroform, 1, 1-dichloroethylene, tetrachloroethylene, dichloroethane, cadmium, methyl ethyl ketone	0.726	D001, D003, D009, D008, D005, D007, D022, D029, D039, D040, D028, D006, D035	Ni-63, Fe-59, Co-58, Fe-55, Mn-54, Sr-90, Nb-95, Tc-99, Cs-134, Sr-89, Cr-144	A	0.000
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Aqueous - Absorbed -- Corrosive	Radioanalytical laboratory procedures, laboratory counting procedures	Bulk Liquid	Corrosive, Lead	1.396	D002, D008	H-3, Sr-90	A	0.001
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Absorbed (Long T1/2 - H-3, C-14, S 35 radioactive liquid)	From research and teaching laboratories	Liquid	Acetone, phenol, acetic acid, TCA, sulfuric acid, chloroform, carbon tetrachloride	2.841	F003, D002, D003, D022, F001, F002	H-3, C-14, P-32, S-35, I-125, Sr-90	A	13.33
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Bulk liquid	Chloroform, acetone, hexane, isopropyl ether, methylene chloride	0.025	D022, F003, D001, F002	H-3, Co-60, Fe-59	A	1.01

Table A-14. Multi-code waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Sealed Source/Gauge/ Instrument User	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Spent reagents, mobile phases	Bulk Liquid	Chloroform, Xylene, Acetone, Ethyl Acetate, Ethyl Ether, Methanol, Toluene, Acetonitrile	2.793	F002, F003, F005, U003	C-14, H-3		2.800
Academic <10,000 Students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Bulk liquid	Methanol, acetic acid	0.042	F003, D003	Se-75	A	0.01
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Normal lab procedures - HPLC - sample workup	Bulk Liquid	Mixture	0.281	F001, F002, F003, D001, U003, U056	C-14	A	0.009
Industrial -- Decontamination facility & waste reduction -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Radiosynthesis and product purification	Bulk liquid	Spent solvents	0.215	D001, F003, F005		A	1035
Industrial -- Manufacturing (<50 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Manufacture of radiolabeled compounds	Bulk Liquid	Waste Flammable Liquid	2.365	D001, F002, F003, F005			
Industrial -- Manufacturing (>200 employees) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Expired product	Liquid	Corrosivity, reactivity, EP toxicity	0.791	D002, D003, D004-32	H-3, C-14	A	0.000
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Metolalchor, methanol, methylene chloride	0.004	F003, F002			
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from manufacture of labeled compounds	Liquid	Organochlorides (methanol, ethyl acetate, xylene, n-hexane, acetone, acetonitrile, ethyl ether, butanol, toluene, benzene, pyridine, methyl ethyl ketone, pentane, acetic acid, tetrahydrofuran, acrylonitrile, cyclohexane	0.152	F003, D001, D018, D038, D035, D002	C-14	A	12397.9
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Biomedical Research laboratory	Organic liquids	Acetonitrile, xylene, methanol, chloroform	2.293	D001, F003, D022	H-3, C-14, S-35, P-32, I-125, Ce-141	A	20

Table A-14. Multi-code waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil		Bulk liquid	1, 1, 2-trichloro-1, 1, 2-trifluorothane, 1, 1, 1-trichloroethane, chlorinated fluorocarbons, toluene, cadmium, chromium, lead, dichlorobenzene, methylene chloride, acetone, xylene	1.075	F001, F003, F005, D006, D007, D008, D027	Co-60, Cs-134, Cs-137	A	0.052
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Mixture with pump oil and laundry solvents	Liquid	Oil and Laundry solvents	0.218	F002, D008	Co-60, Ni-63	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils -- Solvent Contaminated Waste Oil		Bulk liquid	Lead, oil, solvents and water	63.577	D008, F001, F002, F003, F005	Co-60, Cs-137, Cs-134		8.530
Academic >20,000 students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Research	Liquid	Solvents	0.459	D001, F003, F005	H-3, C-14	A	125.934
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Waste from research and service contract	Bulk Liquid	Methanol, Acetic Acid	0.099	D001, D002, F003	S-35	A	0.000
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Other - (specify) - Soil contaminated with C14 and H3	Laboratory research	Bulk liquid	Methanol, toluene, xylene, ethyl ether 1, 1, 1-trichloroethane, carbon tetrachloride	8.800	F003, F005, F002, F001	H-3, P-32, S-35, Ca-45, Cr-41, Rb 86, I-125	A	200.476
Industrial -- Large quantity generator (>1,000 kg/month)	Other -- (Specify) -- Aqueous Corrosive, Hg, Se	Generated by analytical practices	Aqueous	Corrosive, Hg, Se	3.363	D002, D007, D006, D008, D009			
Government -- Federal (Military)	Waste Oils (Contains Lead Oxide)	Pump Oil		Lead oxide	0.004				

Table A-15. Miscellaneous waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students - No EPA Classification	Liquids Aqueous -- Absorbed	Laboratory research	Absorbed liquid	Radionuclides	0.168		P-32, I-125	A	34
Academic >20,000 students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Organic Extraction Solution			0.084				
Medical (Non-Federal) -- Medical	Other			Uranyl Nitrate, Uranyl Acetate	0.011				
Industrial -- Commercial Radiopharmacy	Other (Specify) -- Miscellaneous			Miscellaneous	0.264				
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Radioactive Sealed Sources, Devices, or Gauges	Decommis-sioning instruments-sealed sources	Sealed sources	Sealed sourced	0.034		Ni-62, Cs-137, Pb-210, Co-60	A	0
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Radioactive Sealed Sources, Devices, or Gauges	Production sources waste	Sealed Sources	Sealed Sources - Nickel 63 and Americium 241	1.396		Ni-63, Am-241	B	200.000
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Incinerator Ash or Residuals	Incineration of animal tissues	Solid Uncompacted	Residual Soils	0.141		C-14	A	0.010
Medical (non-federal) -- Medical college/hospital	Other (Specify) -- Uranyl Acetate			Uranyl acetate	0.004				
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Other (specify) -- Solid Soil	Research	Solid soil	Soil	0.631				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint (dried)	Maintenance activities	Solid	Dried paint	0.218		Co-60, Fe-55, Cs-134, Cs-137, Mn-54	A	0.002
Nuclear Reactor Facility -- Pressurized Water Reactor	Paint: Epoxy-based	Maintenance	Solid	Epoxy paint	0.003				

Table A-15. Miscellaneous waste generated in 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	lab experiments in biology and chemistry	Solid	Paper, plastic glass	0.316		H-3, C-14, P-32, S-35, I-125	A	1.7
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Laboratory research	Compacted	Compacted solid trash	23.674				
Industrial -- Sealed Source/Gauge/Instrument User	Trash and/or Solid Waste (not lead) -- compacted	Sample prep., cleaning, bench paper	Compacted Solid	Trash	1.396		C-14, H-3		10.000
Academic >20,000 students	Trash and/or Solid Waste (not lead) -- compacted		Uncompacted trash	Trash	0.382		H-3, C-14, P-32, S-35	A	0
Academic <10,000 Students - Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	All generated from in vitro laboratory experiments only C14 and H3. All are deregulated waste.	Solid	Trash	0.316		H-3, C-14	A	0.5
Academic >20,000 students - Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Lab research and instructions	Solid	Trash	2.408		H-3, C-14, S-35, Cr. 51, P-32, Cd-109, Co-57, Zn-65	A	0
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Lab trash	Un-compacted solid	Trash	1.529		C-14, H-3		1
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratories wastes	Solid Non-compacted	Counting Fluid	4.327		C-14	A	39.800
Academic <10,000 Students	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratory cleanup	Solid	Trash	0.073				
Academic <10,000 Students - No EPA Classification	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratory research	Solid	Radionuclide	0.947		H-3, P-32, I-125	A	39

Appendices B-1 through B-16

Wastes Stored as of December 31, 1990

Table B-1. Ignitable waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Biological Waste (Non-infectious)	Laboratory Counting Procedures. Decay	Absorbed	Tyrosine	0.191	D001	H-3	A	0.203
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Biological Waste (Non-infectious)	Laboratory Counting Procedures. Decay	Absorbed	Tyrosine	0.191	D001	H-3	A	0.203
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Safety Kleen	On-site storage for accumulation before ultimate off-site treatment or disposal	Aqueous	Safety Kleen	0.872	D001	Co-60, Co-58, Fe 55	A	0.680
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Accumulation for future treatment	Aqueous	Ethanol	0.063	D001	C-14, S-35, P-32	A	0.05
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Unable to treat, ship, dispose	Aqueous	Formaldehyde	0.021	D001	H-3, C-14	A	1
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Methanol	0.042	D001			
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research (permanent on-site storage)	Aqueous	Phenol	0.021	D001			
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research lab. counting procedures	Bulk	Petroleum distillates	0.168	D001	H-3	A	0.025
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Cleaning solvent	Bulk liquid	Petroleum distillate	0.073	D001	Co-60, Cs-137	A	10.000

Table B-1. Ignitable waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (non-Federal) -- Research -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	No sub- stantial waste stored as of 12/90 except short half live (<90 days) aqueous liquids. Stored to reduce activity prior to drain discharge. They are stored to comply with our internal policy to reduce drain discharges to lowest possible level.	Bulk liquid	Flammable liquid	0.115	D001	H-3, C-14	A	5.02
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Spent cleaning solvents. Storage for future treatment - Unable to treat or dispose of waste	Bulk Liquid	Solvent	2.203	D001	Co-60, Cs-137, Fe-55, Zn-65	A	0.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation	Bulk Liquid	Tetrahydrofuran	0.698	D001	H-3	A	7.500
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation	Bulk liquid	TNT	0.316	D001	C-14	A	0.029
Medical (Non-Federal) -- Medical College/Hospital -- Small quantity generator (100-	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for decay; storage for off-site treatment	Bulk Liquid	Ignitable	0.078	D001	S-35, P-32	A	2.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage on-site for decay	Bulk Liquid	Formamide	0.042	D001	P-32	A	0.040
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Stored until disposal option available	Bulk Liquid	Ignitability	0.372	D001	C-14	A	2.500
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Paint/solvent waste	Bulk liquids	Flammable solvents	13.802	D001			

Table B-1. Ignitable waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students	Liquids Organic (Solvents, Chlorinated Solvents, etc.)	CIS-2-pentene	Liquid	CIS-2-pentene	0.010	D001	Na-22	A	1
Academic >20,000 students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Misc. research	Liquid	D001	7.260	D001	Unknown	A	0
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research - Superfund Remediation work. No way to dispose of (mixed LLRW)	Liquid	Coal tars/Naphthalene	0.229	D001	C-14, H-3	A	0.05
Industrial -- Waste Broker/Processor - Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation	Liquid	Ignitable Solvent	0.070	D001	Co-60, Cs-137	A	0.000
Industrial -- Research and Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation - for disposal	Liquid	Flammables	0.299	D001	C-14	A	3.000
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Stored for accumulation	Liquid	Acetonitrile	1.489	D001			
Industrial -- Manufacturing (>200 employees on site) -- Small quantity generator (100-1,000	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Used in discontinued process. Storage for generator treatment	Liquid	Alcohol	9.309	D001	Th Natural	A	15.000
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable (not compacted)	Separation Media for HPLC. Storage for decay/separation	Liquid	Acetonitrile	0.038	D001	I-125	A	15
Medical (Non-Federal) -- Hospital >750 beds -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Decay in storage, accumulation	Liquid	Characteristic - Flash Point	11.401	D001	C-14, P-32, I-125		0.000
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	No known disposal method; decay	Liquid and absorbed liquid	Acetonitrile -- HPLC Solvent	0.281	D001	H-3, C-14, S-35, I-125	A	11

Table B-1. Ignitable waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Laboratory Counting Procedures. Decay then to normal trash or to haz mat disposal	Liquid vials	Formaldehyde	0.038	D001	C-14	A	0.005
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation - Waiting for shipment off-site	Liquid, small vials	Various	0.042	D001	H-3, C-14	A	40
Medical (Non-Federal) -- Research -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Ethanol extractions from research. Storage for decay	Organic Liquid	Ignitable	0.004	D001	P-32	A	0.200
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Unable to treat, ship, or dispose of waste.	Solid	Ignitable solvent rags	0.218	D001	Co-60, Fe-55, Cs-137, Cs-134	A	0.001
Medical (Non-Federal) -- Hospital 250-750 beds	Trash and/or Solid Waste (not lead) -- compacted	Storage for decay	Solid	**	0.291	D001	H-3, C-14	A	0.002
Academic <10,000 Students - Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Waste from Research/Cleaning of Lab Equipment. Storage for accumulation	Solid	TNT	0.421	D001	C-14	A	0.034
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Waste Adhesive	Facility maintenance activities	Solid / liquid	Ignitable liquid	0.029	D001	Co-60, Cs-134, Cs-137		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Adhesives	Storage for on-site treatment. Unable to treat, ship, or dispose of waste.	Solid / semi-solid	Ignitable adhesives	0.218	D001	Co-60, Fe-55, Cs-137, Cs-134, Co-58, Mn-54	A	0.005

Table B-2. Corrosive waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Chyromatograph gels. Decay of short half life isotope	Absorbed liquid	Phenol	0.631	D002	P-32, I-125, S-35	A	30
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Chyromatograph gels. Decay of short half life isotope	Absorbed liquid	Phenol	0.631	D002	P-32, I-125, S-35	A	30
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Aqueous	On-site storage for accumulation.	Aqueous	Naoh Sol.	0.872	D002	Co-60, Co-58, Fe-55	A	0.680
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Mercury-Containing Waste	Storage for treatment on-site	Aqueous	H2S04	0.436	D002	Co-60, Mn-54, Fe 59	A	0.388
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Steam gen. cleaning chemical	On-site storage for accumulation before ultimate off-site treatment or disposal	Aqueous	Parkerizing sol	2.615	D002	Co-60, Co-58, Fe-55	A	2.040
Medical (Non-Federal) -- Research - Large quantity generator (>1,000 kg/month)	Other -- (Specify)	Inorganic acid solutions from research. Storage for decay (T 1/2 < 65 days) - Unable to treat, ship or dispose	Aqueous Liquid	Corrosive	0.019	D002	H-3, P-32, I-125	A	13.000
Industrial -- Research & Development (Analytical lab for environmental samples & mixed waste) -- Large quantity generator (>1,000 kg/month)	Other -- (Specify)	Lack of disposal options	Bulk Liquid	Corrosive	0.931	D002	Uranium (Nat)	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Corrosive liquids	Storage for on-site treatment.. Accumulation for future treatment.	Bulk liquid	Corrosive liquids	0.218	D002	Co-60, Fe-55, Cs-137, Cs-134, Mn-54	A	0.002
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Acids	Decay in storage	Liquid	Acetic acid	1.147	D002	I-125	A	0.091

Table B-2. Corrosive waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquids Aqueous, Absorbed	Tool decontamination process. Storage for future treatment	Liquid	Acid	0.654	D002	H-3, Mn-54, Fe-55, Co-58, Ni-63, Zn-65, Cs-134, Cs-137, Co-60	A	0.000
Academic >20,000 students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Accumulation/not in form accepted by waste broker	Liquid	P058, P115 acid	0.084	D002	Uranium, thorium	A	0
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Electrophoretic and chromatographic elutions	Liquid	Phenol	0.042	D002	P-32	A	2
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Other (Specify) -- Phosphoric Acid (Corrosive)	Storage until neutralization can be performed	Liquid	Phosphoric acid	1.308	D002	Co-60, Cs-137, Mn-54	A	0.000
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Other - (specify) - Liquids aqueous	Storage for accumulation - Waiting for disposal option	Liquid, small vials	Various	0.021	D002	H-3, C-14	A	15
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other (Specify) -- Acid			Acid	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Other - (Specify)	Storage for generator treatment - awaiting on site processing	Solid	Electropolisher Filters/ Phosphoric Acid	3.467	D002	Co-60, Cs-137, Fe-55, Zn-65	A	0.000

Table B-3. Reactive waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students -- No EPA Classification	Other biological waste	Decay/ accumulation for offsite treatment	Liquid	Formaldehyde	0.191	D003	H-3	A	0.026
Academic 10,000-20,000 Students -- No EPA Classification	Lead-Containing Waste	Accumulation for offsite treatment	Liquid	Osmium Tetroxide	0.019	D003	U-238	A	0.00033
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Aqueous -- Solidified	Electron microscopy	Solid	Uranyl nitrate, thorium nitrate	0.038	D003	U-238, Th-232		0.08
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 kg/month)	Other -- Metal fines	Casting/cleaning. Storage for generator treatment on-site	Solid	Reactivity III (2)	9.309	D003	Th-232	A	7.100
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Mercury-Containing Waste: Elemental mercury	Permanent on-site storage, no treatment or disposal facility	Solid	Mercury	64.143	D003	U-235, U-238	A	255.600
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research	Solid	Potassium cyanide	0.004	D003	C-14	A	0.001
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Research. Unable to treat/ship	Solid	Sodium cyanide	0.004	D003	C-14	A	0.001

Table B-4. Characteristic metal waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquids Aqueous, Absorbed	Rust inhibitor / close cooling water. No disposal options.	Absorbed	Chromate	0.218	D007	Co-60, Mn-54, Cs-137	A	1.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquids Aqueous, Absorbed	Rust inhibitor / close cooling water. No disposal options.	Absorbed	Chromate	0.218	D007	Co-60, Mn-54, Cs-137	A	1.000
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Aqueous - Absorbed -- Toxic	On-site storage for accumulation - Unable to ship or dispose of the waste	Un-compacted Solid	Lead	1.396	D008	H-3, K-40	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Other -- (Specify) -- Chromated Water	On-site, storage for treatment in 1991	Aqueous	Chromate	3.894	D007	Co-60	A	0.019
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Aqueous -- Absorbed	Mixed waste interim status TSDF awaiting treatment and/or disposal technology	Aqueous	Lead, mercury, barium, chromium, cadmium	0.872	D008, D009, D005, D007, D006	Co-60, Cs-137, Ni-63, Ni-59, Fe-59, Co-58, Fe-55, Mn-54, Sr-90, Nb-95, Tc-99, Cs-134, Sr-89, Pm-147	A	1.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Aqueous -- Absorbed	Mixed waste interim status TSDF awaiting treatment and/or disposal technology	Aqueous	Lead, mercury, barium, chromium, cadmium	0.872	D008, D009, D005, D007, D006	Co-60, Cs-137, Ni-63, Ni-59, Fe-59, Co-58, Fe-55, Mn-54, Sr-90, Nb-95, Tc-99, Cs-134, Sr-89, Pm-147	A	1.000
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Lead-Containing Aqueous liquids	Permanent on site storage	Liquid	Lead Contaminated Aqueous	0.100	D008	U-238	A	2
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity reactor (>1000 kg/month)	Mercury Containing Waste (Liquids)	Accumulation for future treatment / shipment	Aqueous	Mercury	0.048	D009	Co-60, Cs-134, Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor	Mercury-Containing Waste (Liquids)	No treatment capability	Aqueous	Mercury	0.086	D009	Co-60, Cs-137	A	0.080

Table B-4. Characteristic metal waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Antifreeze	Antifreeze changeout. Lack of treatment facilities	Bulk liquid	Chromium	0.349	D007	Co-60, Cs-134, Cs-137	A	0.017
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Chromated Water	Storage for on-site treatment.. Accumulation for future treatment.	Bulk liquid	Chromated water	0.218	D007	H-3	A	0.019
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste	Research. Storage for accumulation	Bulk liquid	Lead	0.287	D008	H-3, C-14	A	0.1
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Research procedure	Liquid	Chromium	0.002	D006			
Medical (non-Federal) --Research -- Large quantity generator (>1000 kg/month)	Other - Specify (Liquid Chromium)	Biomedical research	Liquid	Chromium	0.001	D007	Cr-51	A	1
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1,000 kg/month)	Mercury-Containing Waste: Elemental mercury	Pressure and level gauge. Unable to dispose of waste - On-site storage. Comments: Michigan has been banned from burial ground use as of November 1990.	Liquid	Mercury	0.029	D009	Cs-137, Co-60, Mn-54	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Mercury-Containing Waste	Maintenance	Liquid	Waste paint (w/ possible F-003)	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Aqueous -- Solidified	On-site storage for accumulation before ultimate off-site treatment or disposal	Aqueous	Chromate	0.872	D007	Co-60, Co-58, Fe 55	A	0.680
Academic >20,000 students -- No EPA Classification	Lead-Contaminated trash	Lead Sulfate ppt. Storage for accumulation to ship (210Pb)	Non-compacted solid	Lead sulfate PPT	0.084	D008	Pb-210	A	0.0015
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Mercury-containing waste (sludge from floor and equipment drains in an evaporator)	Storage for generator treatment (SI). Unable to treat, ship, or dispose of waste.	Sludge	Mercury in evaporator	11.623	D009	Cs-137	A	1.100

Table B-4. Characteristic metal waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Surface Impoundment sludge	Storage for generator treatment (SI). Unable to treat, ship, or dispose of waste.	Sludge	Pb, Ni, VA state hazardous	116.229		Cs-137, Co-60	A	0.028
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- Plant Wastewater Treatment (OWS)	Storage for generator treatment (SI). Unable to treat, ship, or dispose of waste.	Sludge	Cr, Pb, Va (state hazardous)	14.529		Cs-137, Co-60	A	0.220
Academic >20,000 students	Lead-Containing Waste: Shielding	Contaminated shielding. Storage for decay, then treatment	Solid	Lead	0.004	D008	P-32, I125	A	0.01
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 kg/month)	Other -- Metal fines	Melting of Mag/2% Th metal. Storage for accumulation on-site - for shipment	Solid	Barium	34.909	D005	Th-232	A	16.200
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filter Media -- Dewatered	On-site storage for accumulation before ultimate off-site treatment or disposal	Solid	Chromated filters	0.436	D007	Co-60, Co-58, Fe 55	A	0.340
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Other (Specify) -- Chromium Waste - Flammable	Uranium recovery dissolution. Permanent on-site storage, no treatment or disposal facility	Solid	Chromium	29.020	D007	U-235, U-238	A	3,272.600
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Neutron shield process chemical	Solid	Chromated trash	0.218	D007	H-3, Mn-54, Fe-55, Co-58, Ni-63, Zn-65, Cs-134, Cs-137, Co-60	A	0.000
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Maintenance and repair of U.S. Navy ships, no mixed waste treatment or disposal capacity	Solid	Chromate	2.834	D007	Co-60	A	0
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Lead Containing Waste - Shielding	Complex disposal methods must be done	Solid	Lead	0.076	D008	Co-60	A	0.72
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Lead-Containing Shielding	Permanent on site storage	Solid	Lead Shielding	0.033	D008	C-136	A	1

Table B-4. Characteristic metal waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste	Unable to dispose	Solid	Lead	5.152	D008	Co-60	A	0
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing waste		Solid	Lead	1.743	D008			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste	Unable to treat, ship, or dispose of waste.	Solid	Waste containing lead	0.218	D008	Cs-137, Cs-134, Co-60, Mn-54, Co-58, Fe-55	A	0.002
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste (contaminated bricks)	Activated Lead Bricks. Using as shields - must be treated before disposal	Solid	Lead	0.191	D008	Bi-207	A	10
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Lead-Containing Waste - Sheeting	Shielding. No disposal options.	Solid	Lead	0.639	D008	Co-60, Mn-54, Cs-137	A	10.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Lead-Containing Waste: Batteries	Accumulation for off-site reprocessing	Solid	Battery	0.015	D008	Cs-137		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Blankets	On-site storage for accumulation before ultimate off-site treatment or disposal	Solid	Lead	0.218	D008	Co-60, Co-58, Fe 55	A	0.170
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Blankets	Permanent on-site storage. Unable to treat.	Solid	Lead	0.436	D008	Fe-55, Ni-63, Co 60, Nb-95, Cs-137, Cs-134, Co-58, Mn-54	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Lead-Containing Waste: Other	Penetrating sealant. Storage for accumulation - Unable to treat, ship or dispose	Solid	Lead	0.436	D008	Co-60, Cs-137	A	0.000
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Shielding	Contaminated Shielding. Unable to dispose of waste	Solid	Lead	0.026	D008	Cs-137, I-125	A	0.01

Table B-4. Characteristic metal waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Shielding	Piping penetration shielding. Permanent on-site storage. Unable to treat.	Solid	Lead	1.090	D008	Fe-55, Ni-63, Co 60, Nb-95, Cs-137, Cs-134, Co-58, Mn-54	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1,000 kg/month)	Lead-Containing Waste: Shielding	Unable to dispose of waste	Solid	Lead	0.174	D008	Cs-137, Co-60, Mn-54	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Shielding	Unable to treat, ship, or dispose.	Solid	Lead	1.743	D008	Co-60, Mn-54, Fe-59	A	1.360
Nuclear Reactor Facility -- Research & Test Reactors	Lead-Containing Waste: Shielding	Storage for decay, accumulation and reuse.	Solid	Lead (Fabricated)	0.070	D008	Sb-124	A	10.000
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste: Shielding	Waste from Research activities. Storage on site for decay	Solid	Lead Shielding	0.057	D008	I125	A	3
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Mercury-Containing Waste (Solids)	Scrap glass from lamps, accumulation for shipment	Solid	Mercury	0.422	D009	Th-32	A	0.24
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Ion Exchange Resins - Dewatered	Residue from treatment of chromated water. Storage for accumulation. Unable to treat, ship, or dispose of waste.	Solid	Ion-exchange resin	0.654		Cs-60, Fe-55, Cs-137, Cs-134	A	0.004
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- NICD Batteries	Storage on-site awaiting disposal options. Unable to treat, ship, or dispose of waste.	Solid / liquid	Corrosive liquid , cadmium	0.145	D006	Co-60, Cs-134, Cs-137		0.000
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Ion Exchange Resins - Solidified (Toxic)	Maintenance and repair of U.S. Navy ships. On site storage pending availability of mixed waste disposal site	Solid resins	Chromium	1.065	D007	Co-60	A	155.5

Table B-4. Characteristic metal waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Waste Broker/Processor -- Large quantity generator (>1,000 kg/month)	Incinerator Ash or Residuals	Storage for generator treatment (solidification / drying) or accumulation	Solid/Ash	Cadmium, Chromium, Lead	25.326	D006, D007, D008	Co-60, Cs-137, Fe-55	A	0.000
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Mercury-Containing Waste (Liquids)	Tracer preservative	Solidified	Mercury	1.055	D009	I-125, Co-57	A	75.76
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Irradiated Reactor or Pool Components	Spent reactor control rods (cadmium); permanent on site storage	Un-compacted solid	Cadmium	0.034	D006	Cd-109, Ag-109m, Cd-113m, Fe-55, Co-60	B	84000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Lead-Containing Waste -- Shielding	Parts of decommissioned experiments/reactor shielding; permanent on site storage	Un-compacted solid	Lead	1.717	D008	Co-60, Mn-54	A	2
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Lead-Containing Waste -- Other	Ash from station stack	Un-compacted solid	Lead	2.789	D008			
Industrial -- Manufacturing (50-200 employees on site) -- Conditionally exempt small quantity generator (<100 kg/month)	Lead-Containing Waste: Lead-contaminated trash	Thin film evaporation. Storage for accumulation	Un-compacted Solid	Lead	2.048	D008	Th-232	A	0.220

Table B-5. Characteristic organic waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Cell washes, disposal nationwide	Absorbed Aqueous	Trichloromethane, phenol	0.051	D022	H-3	A	0
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Cell washes, disposal nationwide	Absorbed Aqueous	Trichloromethane, phenol	0.051	D022	H-3	A	0
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquid Organic - (Solvents, Chlorinated Solvents, etc.) -- Toxic	Storage for decay	Bulk Liquid	Chloroform	0.001	D022	P-32	A	0.300
Industrial -- Research and Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation	Liquid	Chloroform	1.442	D022	H-3	A	1.000
Academic >20,000 students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Reactive	Research. Orphan waste	Liquid	Solvents	0.004	D022	H-3, C-14	A	4
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Permanent onsite storage until method of treatment becomes available	Liquid	Chloroform, and methylene chloride	0.152	D022, D001	H-3	A	3243.26
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	2,4,6-trichlorophenol, aniline	0.015	D042, D001			
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic (Solvents, Chlorinated Solvents, etc.)	DNA Extraction.	Solid	Chloroform	0.071	D022	P-32	A	1

Table B-6. F001 and F002 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Dry clean process (discontinued). Stored pending approved NPDES permit modification.	Liquid	Freon / aqueous	58.114	F002	H-3, Mn-54, Fe-55, Co-58, Ni-63, Zn-65, Cs-134, Cs-137, Co-60	A	0.000
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Maintenance and repair of U.S. Navy ships, unable to dispose	Aqueous	1,1,1-trichloroethane	0.258	F002	Co-60	A	0
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for decay	Aqueous	Tricloroethylene	0.042	F002	S-35, P-32	A	1
Medical (Non-Federal) -- Hospital 250-750 beds -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Aqueous	**	0.388	F001	H-3, C-14	A	0.050
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid organic -- (solvents, chlorinated solvents, etc.)	Component degreasing		Solvent	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Permanent on-site storage (until a processor is identified). No treatment available.	Bulk liquid	1, 1, 1-trichloro-ethane	0.654	F002	Co-60, Cs-137	A	0.037
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Unable to treat, ship, or dispose of the waste.	Bulk liquid	1, 1, 2-trichloro-1, 2, 2-trifluoroethane	3.487	F002	Co-58, Co-60, Cs-134, Cs-137, Mn-54, Zn-65	A	11.400
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Temporary storage for accumulation on-site	Bulk liquid	Chlorofluoro-carbons	4.475	F001	Co-58, Co-60, Cs 134, Cs-137, Mn 54, Sb-125, Cr-51	A	1.700
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Dry cleaning solvent/sludge	Bulk liquid	Freon	0.872	F001	Co-60, Cs-137		1.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage until future disposal / processing can be obtained	Bulk liquid	Freon / solvent	8.078	F001	Co-60, Cs-137, Mn-54	A	0.000

Table B-6. F001 and F002 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Degreasing Solvents	Bulk liquid	Freon, solvents	1.671	F001			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	On-site storage until TSDF is available. Unable to treat, ship, or dispose of waste.	Bulk liquid	Halogenated waste oil (1,1,2-Trichloro-1,1,2-trifluoroethane	14.296	F002	Mn-54, Co-60, Zn-65, Cs-137	A	0.326
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Painting, cleaning, laundry. Storage for generator treatment. Waiting for treatment / disposal.	Bulk liquid	Spent halogenated and non-halogenated solvents and chlorofluoro-carbons	32.893	F002, F003	Co-60, Cs-137, Cs-134	A	0.030
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage waiting availability of off site treatment. Unable to treat, ship, or dispose of waste.	Bulk liquid	Trichloro-trifluoroethane	3.923	F002	Cs-137, Cs-134, Co-60, Mn-54, Co-58, Fe-55	A	0.188
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Cleaning solvent	Bulk liquid	Tricholotrifloroeth ane	0.145	F002	Co-60, Cs-137	A	10.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Cleaning solvent	Bulk liquid	Organics	0.145	F001, F002	Co-60, Cs-137	A	10.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Freon	Storage for off-site treatment	Bulk liquid	Freon	0.218	F001	Cr-51, Fe-55, Co 58, Co-60	A	5.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Freon	Tool decon unit / dry cleaning facility	Bulk liquid	Freon	0.087	F001			
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid organic -- (solvents, chlorinated solvents, etc.) -- Halogenated cleaning solvents	Storage on-site of mixed waste until disposal option becomes available. Waiting for an authorized disposal option.	Bulk liquid	Halogenated decreasing	1.308	F001	Co-60	A	0.227

Table B-6. F001 and F002 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Freon Decontamination unit. Storage for future treatment Unable to treat or dispose of waste	Bulk Liquid	Chlorinated Fluorocarbons	0.872	F001			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint/Solvent waste	Bulk Liquid	Chlorinated Solvents	0.154	F001	Co-60, Cs-137, Mn-54		4.500
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint solvent waste	Bulk Liquid	Freon	1.069	F001	Co-60		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils	Unable to treat, ship, or dispose of waste.	Bulk liquid	Halogenated cleaning and degreasing wastes	8.499	F001	H-3, Co-60, Cs-134, Cs-137		346.900
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Dry cleaning process	Bulk liquid	Chlorofluoro-carbons	0.212	F001			
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Storage for generator treatment. No disposal options.	Bulk liquid	Degreasing waste	1.220	F001	Co-60, Mn-54, Cs-137	A	100.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Unable to dispose of.	Bulk liquid	Freon	3.496	F001	Co-60, Cs-137	A	0.010
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Storage waiting availability of off site treatment. Unable to treat, ship, or dispose of waste.	Bulk liquid	Solvent contaminated oil	1.090	F002	Co-60, Fe-55, Cs 137, Cs-134, Mn 54	A	0.024
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Storage for decay / accumulation for future shipment.	Bulk liquid	Trichloroethylene	0.203	F002	Fe-55, Cs-137	A	0.000

Table B-6. F001 and F002 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for generator treatment. No disposal options.	Bulk liquids	Solvents	1.220	F002	Co-60, Mn-54, Cs-137	A	100.000
Nuclear Reactor Facility -- Pressurized Water Reactor	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	No treatment capability prior to 1991	Liquid	1, 1, 2-trichloro-1, 2, 2-trifluoroethane	0.212	F002	Co-60, Cs-137	A	0.100
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity reactor (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Unable to treat, ship, or dispose of waste	Liquid	1, 1, 2-trichloro-1, 2, 2-trifluoroethane	0.194	F002	Co-60	A	0.019
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Stored on-site pending availability of treatment / disposal ; RCRA permit application in review phase	Liquid	Freon 113	5.230	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid organic -- (solvents, chlorinated solvents, etc.)	Laundry Dry Cleaning. No disposal facility.	Liquid	Halogenated solvent	0.039	F002	Co-60, Fe-55, Ni 63, Mn-54	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Permanent on-site storage. Unable to treat.	Liquid	Halogenated solvents	0.436	F002	H-3, Fe-55, Ni-63, Co-60, Nb-95, Cs-137, Cs-134	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)		Liquid	SKC-NF-ZC-7B	0.145	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid organic -- (solvents, chlorinated solvents, etc.)	Tool degreasing. Insufficient volume to ship.	Liquid	Spent solvents	0.020	F001	Co-60, Fe-55, Ni 63, Mn-54	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for on-site accumulation and awaiting disposal options. Unable to treat, ship, or dispose of waste.	Liquid	Waste solvent	0.901	F001	Co-60, Cs-134, Cs-137		0.000

Table B-6. F001 and F002 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Freon Still Bottoms	Accumulation for off-site reprocessing	Liquid	Freon still bottoms	0.029	F001	Co-60, Cs-137		0.064
Industrial -- Decontamination facility & waste reduction -- No EPA Classification	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage awaiting incineration	Liquid	1, 1, 2-Trichloro - 1, 2, 2-Trifluoroethane	3.430	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Distillation bottoms. Storage for accumulation - Unable to treat, ship or dispose	Liquid	Freon	3.269	F002	Co-60, Mn-54, Cs-134, Cs-137	A	0.200
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Stored for accumulation	Liquid	Halogenated Solvents	0.186	F001			
Medical (non-Federal) --Research -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Biomedical research	Liquid	Methylene chloride	0.005	F002	H3	A	132.43
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Unable to treat, ship or dispose	Liquid	Metolalchlor, methanol, methylene chloride	0.011	F003, F002	C-14, H-3	A	0.223
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Lab Testing	Liquid	Oil & CFC-113, D001, F002	0.774	D001, F002			
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Phenol, methylene chloride	0.011	D001, F002			
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Lab Solvent	Liquid	TBP, TEMP & CF#-113-F002	0.830	F002			
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Lab Testing	Liquid	Waste acetone-D001, F002	0.250	D001, F002			

Table B-6. F001 and F002 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Degreasing	Liquid	Waste CFC-11-F002	0.137	F002			
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Other (Specify) -- TCA/TCE waste - Reactive	Research and Development distillation.	Liquid	TCA/TCE	0.183	F002	U-235, U-238	A	0.055
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Paint (& Thinner)	Storage until future disposal / processing can be obtained	Liquid	Paint / solvent	0.174	F001	Co-60, Cs-137, Mn-54	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil		Liquid	Freon 112	7.264	F002	Cs-134, Cs-137, Co-58, Co-60	A	2.500
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Permanent on-site storage. Unable to treat.	Liquid	Halogenated solvents	1.308	F001	H-3, Fe-55, Ni-63, Co-60, Nb-95, Cs-137, Cs-134	A	0.060
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Accumulation of waste for future treatment	Liquid	Oil with Halogenated Solvents	23.545	F001	Cs-137, Co-60, Cs-134, Sb-125, Mn-54, Ag-110M, Ce-141, Co-57, Ru-106	A	8.307
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (free from solvent contamination)		Liquid (oil)	Waste oil	1.743	F001			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Solidified Evaporator Bottoms/Concentrates/Sump sludge	Awaiting treatment options.	Liquid	Freon TF	0.015	F002	Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Solidified Evaporator Bottoms/Concentrates/Sump sludge		Liquid	Saf-T solvent 5	0.040	F002, D039			

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Filters from dry cleaning and degreasing machines. Accumulation pending	Liquid solid	Freon 113	3.487	F002	Co-60, Cs-134, Mn-54, Sb-125, Zn-65	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Still bottoms from recovery.	Semi-liquid sludge	Halogenated solvents	0.872	F002			
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Solidified Evaporator Bottoms/Concentrates/Sump Sludge	Dry clean process (discontinued). Storage for future treatment.	Semi-sludge	Evap. sludge / solvent	0.747	F002	H-3, Mn-54, Fe-55, Co-58, Ni-63, Zn-65, Cs-134, Cs-137, Co-60	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	Awaiting treatment options.	Solid	Freon filters	0.337	F002	Ag-110m, Mn-54, Cs-137	A	0.000
Industrial -- Research & Development	Filters, Mechanical	Freon decon. machines. 15 cu. ft. (2, 55 gallon drums) dry filter cartridges - No place to dispose	Solid	Still Bottoms	7.096	F002	C0-60, Mn-54, Fe-55	A	62.400
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	Storage for accumulation. Unable to treat, ship, or dispose of waste.	Solid	Trichlorotrifluoroethane	1.526	F002	Co-60, Fe-55	A	0.010
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other (Specify) -- Dry cleaning filters	Dry clean process (discontinued). Storage for future treatment.	Solid	Filters	6.146	F002	H-3, Mn-54, Fe-55, Co-58, Ni-63, Zn-65, Cs-134, Cs-137, Co-60	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other (specify) -- Solid Freon		Solid	Freon	0.058	F001	Not yet known	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify)	Decontamination activities	Solid	Freon	0.116	F001	Co-60, Cs-134, Cs-137		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Solidified Evaporator Bottoms/Concentrates/Sump Sludge	Dry cleaning protective clothing. Accumulation of waste for future treatment	Solid	Freon Sludge	0.424	F002	Cs-137, Co-60, Cs-134, Sb-122, Mn-54	A	0.269

Table B-6. F001 and F002 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Decontamination facility & waste reduction -- No EPA Classification	Trash and/or Solid Waste (not lead) -- compacted	For nuclear power plant servicing	Solid Compacted	1,1,2-Chloro-1,2,2-Trifluoroethane	0.035	F002	Co-58, Co-60, Cs 137	A	0.006
Industrial -- Waste Broker/Processor -- Large quantity generator (>1,000 kg/month)	Solidified Evaporator Bottoms/Concentrates/Sump Sludge (Freon still bottoms on liquid)	Laundry Cleaning. Storage awaiting treatment capability	Solid/Liquid	Freon Still Bottoms, 1,1,2-Trichloro-1,2,2-trifluoroethane	0.528	F002	Co-60, Cs-137, H-3, Am-241	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Filters, Mechanical	Storage until future disposal / process can be obtained	Compacted solid	Freon	0.436	F001	Co-60, Cs-137, Mn-54	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Filters, Mechanical	Storage until future disposal / processing can be obtained	Compacted solid	Freon	0.639	F001	Co-60, Cs-137, Mn-54	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filter Media -- Dewatered	Filter changeout on dry-cleaner, laundry processing	Uncompacted solid	Dry-cleaner filters	1.090	F002	Co-60, Cs-134, Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filters, Mechanical	Unable to ship	Uncompacted solid	1, 1, 2-trichloro-1, 1, 2-trifluoroethane	0.436	F002	Fe-55. Ni-63, Co 60, Cs-137, C-14, Ce-144, Sb-125, Ru-106, Cs-134, Ag-110m	A	56.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Filters, Mechanical	Storage until future disposal can be obtained.	Uncompacted solid	Freon	1.889	F001	Co-60, Cs-137, Mn-54	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Filters, Mechanical	Dry cleaning	Uncompacted solid	Tricholotrifloroethane	2.615	F002	Co-60, Cs-137	A	50.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Filters from recovery.	Uncompacted solid	Halogenated solvents	1.090	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity reactor (>1000 kg/month)	Other (Specify) -- 1,1,2-Trichloro-1,2,2-triflurorethane	Tool decontamination unit. Unable to treat, ship, or dispose of waste	Uncompacted solid	1, 1, 2-trichloro-1, 2, 2-trifluoroethane	0.039	F002	Co-60	A	0.000

Table B-6. F001 and F002 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify)	Dry cleaning filters	Uncompacted solid	Freon	1.743	F002			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Other - (Specify)	Dry cleaning filters/sludge	Uncompacted Solids and Bulk Liquid	Freon	0.854	F002	C0-60, Cs-134, Cs-137		0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other - (Specify) -- Liquid Freon	Dry cleaning filter cartridges and sludge. No available treatment	Uncompacted solids and bulk liquid	Freon	5.521	F002	Co-60, Cs-137		0.001
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Dry Cleaning Filter Cartridges and Sludge	No treatment performed.	Uncompacted solids and bulk liquid	Freon	33.706	F002	Co-60, Mn-54	A	55.020
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid organic -- (solvents, chlorinated solvents, etc.)	Clothing dry cleaning		Dry cleaning fluid	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid organic -- (solvents, chlorinated solvents, etc.)	Degreasing		Freon	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid organic -- (solvents, chlorinated solvents, etc.)			Freon-listed haz. waste	0.218				

Table B-7. F003 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-uclides	NRC Class	Cumul-ative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity reactor (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Accumulation for future treatment / shipment	Aqueous	Acetone	0.145	F003	Co-58, Co-60, Mn-54	A	4,624.000
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Benzene	0.021	F003			
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Aqueous	Xylene	0.021	F003			
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Other - (Specify) -- Corrosive liquids not absorbed	Storage for accumulation	Aqueous liquid	Methanol	0.104	F003	H-3, C-14	A	0.9
Academic (<10,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	HPLC, unable to treat or ship	Bulk liquid	Acetonitrile, methanol	0.436	D001, F003	H-3, C-14	A	0.24
Academic >20,000 students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation	Bulk liquid	Ether	0.057	F003			
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	No disposal route available	Bulk liquid	Liquid organic	0.316	F003	H-3, C-14	A	1
Academic >20,000 students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation	Bulk liquid	Methanol	0.057	F003	C-14	A	1.55
Industrial -- Research and Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation - onsite	Bulk liquid	Methanol	1.759	F003	C-14	A	2.5
Medical (Non-Federal) -- Research - Conditionally exempt small quantity generator (<100 kg/month)	Other Biological waste (Non-infectious)	Accumulation for future treatment	Bulk Liquid	Methanol	0.186	F003	H-3	A	0.560
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Research procedure	Liquid	Butane	0.001	F003			

Table B-7. F003 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Ether, ethyl acetate, hexane	0.004	F003, D001			
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- flammable	Awaiting treatment options.	Liquid	Filmco special ind. solvent	0.057	D001, F003	Cs-137	A	0.000
Medical (non-Federal) --Research -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Biomedical research	Liquid	Flammable solvents	0.026	F003	C-14	A	0.025
Government -- Federal	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Chemical laboratory	Liquid	Liquid	0.034	F003	Tc-99	A	0.005
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Aqueous -- Absorbed	Buffers/page cells. Stored for accumulation prior to shipment - Decay	Liquid	Methanol	0.093	F003	S-35, I-125	A	2.000
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Stored for accumulation	Liquid	Methanol	0.186	F003			
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Tracer manufacture, no disposal available	Liquid	Methanol, pyridine	0.035	F003, D001	Co-57	A	100
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Unable to treat, ship or dispose	Liquid	Metolalchlor, butanol	0.004	F003	Natural uranium	A	1.474
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Cannot dispose	Liquid	Non-Halogenated Solvents	0.652	F003	C-14	A	4.000
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Tetrahydrofuran, hexane, ethyl ether, benzene, methanol, ethyl acetate, oxadiazon, ethanol	0.023	D001, F003			
Industrial -- Decontamination facility & waste reduction -- No EPA Classification	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Accumulation for storage	Liquid	Xylene	2.111	F003	H-3, Co-60, Cs-137	A	0.017

Table B-7. F003 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Industrial -- Research and Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation - for disposal	Liquid	Xylene	0.176	F003	H-3	A	1.400
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Aqueous -- Solidified	Mixed waste interim status TSDF awaiting treatment and/or disposal technology	Solidified	Acetone, waste oil	1.743	F003	Co-60, Cs-137, Ni-63, Ni-59, Fe-59, Co-58, Fe-55, Mn-54, Sr-90, Nb-95, Tc-99,	A	0.000
Industrial -- Manufacturing >200 employees on site -- Large quantity generator (>1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Accumulation for shipment	Un-compacted Solid	Acetone Xylene	0.264	F003	Co-60, Cs-137	A	1.000
Industrial -- Manufacturing >200 employees on site -- Large quantity generator (>1,000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Wipe rags and paint brushes. Accumulation	Compacted Solid	Acetone, Xylene	0.264	F003	Co-60, Cs-137	A	1.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- compacted	Lab Research/Biomedical. On site storage for decay and permanent on-site storage (indefinite)	Compacted solid	Acetonitrile, methanol, phenol, chloroform	0.573	D001, F003	H-3, C-14, P-32, S-35, I-125, Na-22, Ce-141	A	25

Table B-8. F005 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Academic 10,000-20,000 Students	Liquids Aqueous - Absorbed	Wrong absorbed material in drums, chunky v-lite	Absorbed liquid	Toluene	7.576	F005	H-3, C-14	A	50
Nuclear Reactor Facility Research & Test Reactors	Liquids Aqueous, Absorbed	Old research, accumulation of waste	Absorbed liquid	Xylene, toluene	2.102	F003, F005	H-3, C-14, Cs 137, U-238		0.3
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Unable to dispose of mixed waste	Absorbed Liquid	1,2,4-Trimethylbenzene	0.126	F005	C-14	A	0.1
Academic <10,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium -- (fluids or vials)	Unable to dispose of mixed waste	Absorbed Liquid	1,2,4-Trimethylbenzene	0.126	F005	H-3	A	0.001
Academic >20,000 students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic - (Solvents, Chlorinated Solvents, etc.) -- Flammable	Research. Orphan waste	Liquid	Solvents	0.382	D001, F003, F005	H-3, C-14	A	6
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Oxidation of Biological Samples. HPLC Analytical Count. Storage for accumulation - onsite	Liquid	Toluene, ingitability	0.500	F005, D001	H-3, C-14, P-32, Ca-45	A	0
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Lab Research/Biomedical. Indefinite on-site storage (awaiting disposal)	Organic solvents	Acetonitrile, methanol, phenol, chloroform, formaldehyde, toluene, xylene, ethanol ether	2.293	D001, F003, F005,	H-3, C-14, P-32, S-35, I-125, Na-22, Ce-141	A	10
Government -- Federal (Military) -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Solidified	No mixed waste treatment or disposal capacity	Solid	Acetone, mek	14.168	F003, F005	Co-60	A	0

Table B-8. F005 waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radio-nuclides	NRC Class	Cumul-ative Activity (mCi)
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Storage for accumulation	Un-compacted solid	Toluene	0.107	F005	P-32	A	0
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted -- Flammable	Storage for accumulation for waste shipment	Un-compacted solid	Xylene, toluene	0.104	F003, F005	H-3, C-14	A	0.001

Table B-9. P and U listed waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation	Absorbed liquid	Benzo(A)pyrene	0.069	U022	H-3		0.351
Industrial -- Manufacturing (>200 employees on site) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Toxic	Product separation, storage for decay unable to dispose of waste	Bulk liquid	Acetonitrile, methanol	0.528	U003, U154		A	150
Industrial -- Research & Development	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for decay	Bulk Liquids	Acetonitrile	0.946	U003	I-125	A	10.000
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	On site storage for accumulation	Liquid	Chloroform	0.034	U022	C-14		0.9
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Other -- (Specify) -- Liquid Irridite 14-2 (Chromic Acid Mixture)	Accumulation for off-site reprocessing	Liquid	Irridite 14-2	0.058	U032	Cs-134, Cs-137, Mn-54		0.001
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Research procedure	Liquid	Chloroform	0.002	U044			
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation - Waiting for shipment pickup	Liquid	Methylene Chloride, Toluene, Ethyl Acetate, Ethyl Ether, Acetonitrile	1.257	U045, U220, U112, U117, U003	C-14	A	2.500
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Research Procedure. Unable to dispose of waste	Liquid	Ethyl ether	0.004	U117	H-3, C-14	A	0.817
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from research	Liquid	Methanol	0.034	U154			
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Research procedure	Liquid	Methanol	0.002	U154			

Table B-9. P and U listed waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research and Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation	Liquid	Tetrahydrofuran	0.299	U213	H-3	A	2.000
Academic 10,000-20,000 Students Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) - Flammable	Research procedure	Liquid	Acetic acid	0.002	P058			
Nuclear Reactor Facility -- Pressurized Water Reactor	Mercury-Containing Waste: Liquids	No disposal options. unable to treat / dispose.	Liquid	Mercury	0.002	P092	Co-60, Cs-137	A	0.000
Academic <10,000 Students -- No EPA Classification	Ion Exchange Resins - Dewatered	Storage for accumulation	Solid	14C-Benz (A) Anthracene, Benz (A) anthracene	0.071	U018, U022	C-14		0.001
Government -- Federal (Research & Development) -- No EPA Classification	Other -- (Specify) -- Liquid Lab Wastes	Liquid lab wastes, storage due to unavailability of treatment facility	Solid	Toluene, xylene, methyl isobutyl ketone, methyl ethyl ketone, benzene	0.828	U220, U239, U161, U159, U019	Na-22	A	0.007
Academic <10,000 Students -- No EPA Classification	Other - (specify) - Solid Beryllium	Cf252, Np237, Am241, Ra226 open sources for which we were seeking disposal	Solid	Beryllium	0.484	P015	Pu-239	A	6000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other -- (Specify) -- Hydrazine Waste	Storage on-site awaiting disposal options. Unable to treat, ship, or dispose of waste.	Solid / liquid	Hydrazine	0.291	U133	Co-60, Cs-134, Cs-137		0.000
Medical (Non-Federal): -- Hospital >750 beds -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Needles, vials, trash (papers, etc.) for decay - To be compacted by an outside broker	Solid	U154	3.201	U154	I-125, Co-57	A	1.800
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Page cells. Stored for accumulation prior to shipment - Decay	Solid	Acrylamide, sodium azide	0.047	U007, P105	S-35, I-125	A	5.000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Storage for accumulation	Trash/solid waste	Benzo (A)pryene	0.172	U022	H-3		0.187

Table B-10. Oil waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Manufacture of electron tubes. Stored to accumulate sufficient quantity for disposal	Absorbed Liquid	Absorbed Vacuum Pump Oil	0.465		H-3	A	0.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Waste oil free from solvent contamination	Hold for decay	Bulk	Waste oil	0.084		Zn-65	A	0.1
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Solvent containing waste oil	Decay for storage	Bulk Liquid	Vacuum Pump Oil Acid	0.099		H-3	A	0.346
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal oils from pumps for example) -- Solvent-contaminated waste oil	Decontamination solutions	Bulk Liquid	Spent Solvents	2.615	F001, F002, F003, F004, F005	H-3, C-14, Cs-137, Cs-134, Co-60	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil		Bulk liquid	Mineral spirits	0.872	D001	Co-60, Cs-137	A	0.001
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	On-site storage for accumulation before ultimate off-site treatment or disposal	Bulk liquid	Solvent contaminated oil	3.051		Co-60, Co-58, Fe 55	A	2.380
Industrial -- Manufacturing (<50 employees on site) -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	On-site storage for accumulation - For treatment or shipment	Bulk Liquid	Waste Oil	0.946		C-14	C	150.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Accumulation for future treatment	Bulk liquid	Motor oil	0.776		Co-60, Co-58	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Storage for accumulation. Accumulation for future treatment / shipment.	Bulk liquid	Waste oil	1.090		Co-60, Cs-137, Cs-134	A	0.026

Table B-10. Oil waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Temporary storage for accumulation on-site. Accumulation for future treatment or shipment.	Bulk liquid	Waste oil	0.639		Co-60, Cs-137, Mn-54	A	0.002
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Storage for generator treatment. Accumulation for treatment.	Bulk liquid	Waste oil - Calif. listed	32.457		Co-60, Cs-137, Cs-134	A	1.500
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Waste Oils free from solvent contamination	Used diesel engine oil. Accumulate for decay or generator treatment	Bulk Liquid	Ignitable	0.047	D001	C-14	A	0.400
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 kg/month)	Waste Oils free from solvent contamination	Vacuum pump oil. Storage for accumulation - for future shipment	Bulk Liquid	Vacuum Pump Oil	0.028		H-3	A	0.006
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oil	Maintenance	Liquid	Waste Oils	21.793		Co-60, Cs-137	A	0.000
Academic <10,000 Students	Waste oil free from solvent contamination	Pumps	Liquid	Waste oil	0.004	D001			
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)	Bulked and tested for deregulated amounts - chemical waste	Liquid	Waste oil	0.042	D001	H-3	A	2
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)	No NRC/EPA permitted disposal facility	Liquid	Waste Oils	0.167	D001	H-3, C-14	A	2
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example) -- Waste lubricating oil, dewatered	On-site, storage for possible future incineration	Liquid	Oil	4.853		Co-60, Cs-137	A	0.002
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Used pump oils. Accumulation storage for shipment	Liquid	Benzene	0.264	D018	U-235, U-238	A	0.001

Table B-10. Oil waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Accumulation for off-site reprocessing	Liquid	Oil / halogenated	0.218		Cs-137, Co-60		1.920
Nuclear Reactor Facility -- Pressurized Water Reactor	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	No disposal options. Unable to treat / dispose.	Liquid	Toluene	0.029	U220	Co-60, Cs-137	A	0.000
Industrial -- Manufacturing >200 employees on site -- Large quantity generator (>1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Accumulation for shipment	Liquid	Oil	0.791		Co-60, Cs-137	A	30.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1,000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Seal oil and pump lubricants. Storage for accumulation - Unable to treat, ship or dispose	Liquid	Oil	4.359		Co-60, Mn-54	A	0.130
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Storage on-site for generator treatment (solidification). Storage for future treatment.	Liquid	Used oil	8.717		Co-60, Cs-134, Cs-137		0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (waste oil free from solvent contamination)	Station lubricants from RCA	Liquid	Waste oil	8.717		H-3, Mn-54, Fe-55, Co-58, Ni-63, Zn-65, Cs-134, Cs-137, Co-60	A	0.000
Academic 10,000-20,000 Students - No EPA Classification	Waste Oils	Pump oil, accumulate to dispose	Oil	Waste oil	0.042	D001	H-3	A	1
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	1/4 oil; 1/2 sludge			1/4 oil; 1/2 sludge	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Oil / sludge trash	Outage catch-all drum		Oil / sludge trash	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Oil with gelatin odor	Pump maintenance		Oil with gelatin odor	0.218				

Table B-10. Oil waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Oil with metal slings	Vacuum pump oil changeout		Oil with metal slings	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Oil, sludge, SM like CKD	Degreasing		Oil, sludge, SM like CKD	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Radioactive Oil	Radioactive oil		Radioactive oil	0.029				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)			Oil	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)			Oil, can't solidify	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)			Oil, heels	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)	Antifreeze for in-house equipment		Oil, watery	0.436				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example)	Antifreeze in equipment		Thin oil	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Pump maintenance		Oil with solvent	0.218				

Table B-11. Other organic waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)			Phenol, Chloroform	0.084				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other (specify) -- Mixed solvents			Mixed solvents	0.218				
Academic	Other (specify) -- Phenol/Chloroform			Phenol, Chloroform	0.042				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other (Specify) -- Propylene, glycol, dipotassium	Clothing dry cleaning		Propylene, glycol, dipotassium	0.639				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Other (Specify) -- Pros propylene glycol	Contaminated area painting		Pros propylene glycol	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generated (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Permanent on-site storage	Bulk liquid	Paraffin - naphthas	0.029		Co-60, Cs-137	A	50.000
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Insuff. quantity to justify commercial disposal	Bulk liquid	Xylene, toluene	0.042		H-3		11.3
Academic <10,000 Students -- No EPA Classification	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	C14-labeled mirex	Liquid	Mirex	0.084		C-14	A	0.05
Academic (<10,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Medical research. Historical waste undergoing analysis for disposal to	Liquid	Liquid organic	0.287		H-3	A	41
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Lab research	Solid	Dieldrin	0.004				
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Waste from Research, Spent Reagents. Storage for accumulation	Un-compacted solid	Nitrosonor-nicotine	0.176				

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On-site accumulation	Absorbed Liquid	Toluene	0.186	F005	H-3	A	0.005
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	On-site accumulation	Absorbed Liquid	Toluene	0.233	F005	P-32, S-35	A	0.050
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Unable to ship	Solidified absorbed	Toluene, xylene	0.001	F003, F005	H-3, C-14	A	0
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Absorbed Liquid	Biocount Scintillation	0.093	D001	H-3	A	0.060
Medical (Non-Federal) -- Laboratory	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation to be shipped off site	Absorbed Liquid	Xylene, Toluene	1.140	F005, F003	H-3	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Storage waiting availability of off-site treatment. Unable to treat, ship or dispose of waste.	Absorbed liquid	Liquid scintillation fluid	0.218	F005	Am-241	A	0.000
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Unable to dispose of mixed waste	Absorbed Liquid	1,2,4-Trimethylbenzene	0.126	F005	C-14	A	0.1
Academic <10,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Unable to dispose of mixed waste	Absorbed Liquid	1,2,4-Trimethylbenzene	0.126	F005	H-3	A	0.001
Government -- Federal (Research & Development) -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On site storage	Absorbed liquids	Xylene, toluene	0.258	F003. F005	H-3, C-14	A	0.062
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Vials, absorbed	Xylene	0.287	F003	C-14, H-3	A	0.039
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation	Vials, absorbed	Xylene	0.287	F003	C-136	A	0.001

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Absorbed Liquid	Biocount Scintillation	0.093	D001	H-3	A	0.060
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Storage waiting availability of off-site treatment. Unable to treat, ship or dispose of waste.	Absorbed liquid	Liquid scintillation fluid	0.218	F005	Am-241	A	0.000
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On-site accumulation	Absorbed Liquid	Toluene	0.186	F005	H-3	A	0.005
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	On-site accumulation	Absorbed Liquid	Toluene	0.233	F005	P-32, S-35	A	0.050
Medical (Non-Federal) -- Laboratory	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation to be shipped off site	Absorbed Liquid	Xylene, Toluene	1.140	F005, F003	H-3	A	0.000
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Vials, absorbed	Xylene	0.287	F003	C-14, H-3	A	0.039
Government -- Federal (Research & Development) -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On site storage	Absorbed liquids	Xylene, toluene	0.258	F003. F005	H-3, C-14	A	0.062
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation	Vials, absorbed	Xylene	0.287	F003	C-136	A	0.001
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Accumulation for treatment	Aqueous	Ignitable	14.193	D001	H-3	A	1.000
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Flammable	Accumulation for treatment	Aqueous	Ignitable	47.309	D001			

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation vials/biological research	Aqueous	Toluene, Xylene	0.573	F005, F003	H-3, C-14		2.36
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On-site storage for accumulation - Scintillation fluid.	Aqueous	Xylene	2.141	F003	C-14	A	0.010
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	On-site storage for accumulation - Scintillation fluid.	Aqueous	Xylene	2.141	F003	H-3, S-35	A	0.010
Medical (non-federal) Medical college/hospital -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Onsite storage for accumulation	Aqueous	Toluene, xylene	6.842	F003, F005	C-14, H-3	A	31.978
Medical (non-federal) Medical college/hospital -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Onsite storage for accumulation	Aqueous	Toluene. xylene	17.850	F003, F005	C-14, H-3, S-35, I-125	A	72.317
Industrial -- Manufacturing (50-200 employees on site) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Phosphate buffer contains sodium azide as preservative. Storage for accumulation - For future shipment due to low volume	Aqueous	Sodium Azide	0.465	P105	I-125	A	0.700
Industrial -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Aqueous	Non-halgenated solvents	0.106	F003	H-3, C-14	A	7
Industrial -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation	Aqueous	Non-halogenated solvents	0.070	F003	Cd-109, Ag-110m	A	1
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - for shipment	Aqueous	Xylene	0.018	F003	H-3, C-14, P-32, S-35	A	0.050

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Research - Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Stored in another waste drum lined with absorbed particles - Small volume accumulated	Aqueous	Toluene	0.078	F005	H-3	A	0.000
Medical (Non-Federal) -- Research - Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Stored in another waste drum lined with absorbed particles - Small volume accumulated	Aqueous	Toluene	0.039	F005	P-32	A	0.000
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Tissue solubilizer. Storage for accumulation	Aqueous	Toluene	0.698	F005	C-14, H-3	A	1.200
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Hold for decay	Bulk	Toluene	0.168	F005	P-32, S-35	A	0.113
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Radioactive decay	Bulk	Xylene	0.168	F003	P-32, S-35	A	0.113
Government -- Federal (Hospital) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)		Bulk liquid	Toluene	1.374	U022	H-3	A	2
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	32P Waste - on site storage for decay	Bulk liquid	Toluene	0.004	F005	P-32		0.5
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	3H/14C Waste -on site, permanent storage (V-small quarts)	Bulk liquid	Toluene	0.005	F005	H-e, C-14		0.25
Industrial -- Research & Development -- Small quantity generator (<100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulated for future shipment	Bulk Liquid	Toluene, Xylene	1.862	F005, F003	H-3	A	0.030
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation for disposal (offsite incineration)	Bulk liquid	Ignitability (toluene)	3.121	D001	C-14	A	0.278
Government -- Federal (Research & Development) -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation for future shipment	Bulk liquid	Toluene	0.003	F005	H-3, C-14	A	5

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Decay	Bulk Liquid	Xylene	0.105	F003	P-32	A	5
Government: -- Federal (hospital) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Extractions	Bulk Liquid	Toluene	0.078	F005			
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	From counting procedures -- storage for accumulation	Bulk Liquid	Xylene	0.084	F005	H-3, C-14	A	1500
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Lab Assay (Liquid Scintillation). Accumulation for shipment	Bulk Liquid	Toluene	0.007	F005	\h-3, C-14	A	0.003
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and H-3 (fluids or vials) -- Toxic	Laboratory counting procedures, waste from research	Bulk liquid	Xylene	7.900	F003	P-32	A	200
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures. Accumulation for shipment.	Bulk Liquid	Toluene	0.698	F005	H-3	A	5.000
Government: -- Federal (hospital) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Bulk Liquid	Toluene, Xylene	0.582	F003, F005			
Government: -- Federal (hospital) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Bulk Liquid	Toluene, Xylene	0.582	F003, F005			
Academic (<10,000 students)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid Scintillation Vials. On site awaiting shipment	Bulk liquid	Xylene, toluene	0.069	F003, F005	H-3, C-14	A	0.05
Medical (Non-Federal) -- Hospital <250 beds -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Long term temporary storage with activity >0.05 UCI/ML/on site - Cannot ship radiation waste	Bulk Liquid	Xylene, Toluene	1.940	F003, F005	H-3, C-14	A	0.000

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	On site decay and accumulation for transport	Bulk liquid		0.707	F005, F003, F001	Others	A	8.3
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On-site storage until TSDF is available. Unable to treat, ship, or dispose of waste.	Bulk liquid	Liquid scintillation	0.096	F003, F005	H-3	A	0.091
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing radioisotopes other than C-14 and / or tritium -- (fluids or vials) -- Flammable	Permanent on-site storage. Unable to dispose.	Bulk liquid	Flammable liquid	0.436	D001	H-3	A	0.900
Industrial -- Decontamination facility & waste reduction -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Radiosynthesis and product purification	Bulk Liquid	D001, F002, F003, F005	0.791	D001, F002, F003, F005			
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Research	Bulk liquid	Toluene, xylene	0.316	F003, F005			
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research. Storage for accumulation	Bulk liquid	Xylene, toluene	1.720	F003, F005	H-3, C-14	A	24
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research. Unavailable disposal options	Bulk liquid	Xylene, ethyl acetate, methanol, toluene	50.453	F003, F005	H-3, C-14, P-32, S-35	A	3.8
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Research. Storage for accumulation	Bulk liquid	Xylene, toluene	6.880	F003, F005	H-3, C-14, Ca-45, S-35	A	85
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation counting	Bulk liquid	Pseudocumene	0.416	D001	H-3	A	0.16
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation Fluid for accumulation	Bulk liquid	Toluene	0.191	F005	H-3, C-14		60

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 students (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Scintillation Vials	Bulk Liquid	Flammable Waste	0.153	F005	H-3	A	0.2
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Spent LS cocktail	Bulk liquid	Xylene, toluene	0.050	F003, F005	H-3	A	0.004
Medical (Non-Federal -- Medical college/hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Spent non-halogenated solvents. Storage for accumulation for future shipment	Bulk Liquid	Toluene	1.455	F005	H-3, C-14	A	2.000
Medical (Non-Federal -- Medical college/hospital	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Spent non-halogenated solvents. Storage for decay - Accumulation for future shipment	Bulk Liquid	Toluene	1.455	F005	S-35, Cr-51, Na-22	A	2.000
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage (onsite) for accumulation	Bulk liquid	Untrafluor high sol (spent LS Cocktail)	0.025	D001	H-3	A	0.004
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or H-3 -- (fluids or vials) -- Flammable	Storage for accumulation	Bulk Liquid	Toluene	0.000	F005	H-3, C-14	A	0
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Bulk Liquid	Xylene	0.698	F003	H-3	A	7.500
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Bulk Liquid	Scintillation Fluid Cocktails	0.698	D001	H-3, C-14	A	0.005
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Bulk liquid	Xylene, toluene	0.631	F003, F005	H-3, C-14	A	0.5
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Bulk liquid	Xylene	0.094	U239	H-3, C-14	A	7

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Storage for accumulation	Bulk liquid	Toluene, xylene	0.337	F005, F003	H-3, C-14	A	2
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation	Bulk liquid	Xylene, toluene	0.631	F003, F005	H-3, C-14, S-35, Ca-45, I-125	A	0.5
Medical (non-Federal) --Research -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation	Bulk liquid	Toluene, xylene	0.287	F003, F005	P-32, C-136, Na-22	A	0.04
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation	Bulk liquid	Xylene	0.094	U239	S-35	A	7
Medical (Non-Federal) -- Research - Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - For future treatment	Bulk Liquid	Trimethylbenzene, Isopropanol	0.465	F003, F005	H-3, Cr-51	A	0.065
Industrial -- Research and Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - onsite	Bulk liquid	Toluene, xylene	1.407	F005, F003	C-14, H-3	A	6
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - Waiting for shipment off-site	Bulk liquid	Ignitable	0.631	D001, F005, F003	H-3, C-14	A	70
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Storage for accumulation and generator treatment	Bulk liquid	Xylene	0.268	F003	H-3, C-14	A	3.5
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Storage for accumulation and generator treatment	Bulk liquid	Xylene	0.956	F003	S-35, Eu-152, Tm-171, Np-237, Pu-238, Am 241, Cm-244, Cf 252	A	0.3
Academic (10,000-20,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage for accumulation, for future shipment	Bulk liquid	Acetone, toluene, pseudocumene	0.050	F003, F005, D001	H-3, C-14	A	7.05
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Storage for accumulation. Commercial liquid scintillation solution.	Bulk Liquid	Ignitable	0.047	D001	Na-22, Cl-36	A	0.000

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and H-3 -- (fluids or vials) -- Flammable	Storage for decay	Bulk Liquid	Toluene	0.000	F005	P-32	A	0
Medical (Non-Federal) -- Hospital <250 beds -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Storage for decay/long term temporary storage on site - Cannot ship radiation waste	Bulk Liquid	Xylene, Toluene	0.194	F003, F005	S-35	A	0.000
Medical (non-Federal) --Research -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for generator treatment	Bulk liquid	Toluene, xylene	0.287	F003, F005	C-14, H-3	A	0.046
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for generator treatment. Commercial liquid scintillation solution.	Bulk Liquid	Ignitable	0.186	D001	C-14, H-3	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing radioisotopes other than C-14 and / or tritium -- (fluids or vials)	Storage for vendor treatment	Bulk liquid	Toluene	0.203	F005	Co-60, Cs-137, H-3	A	0.000
Government -- Federal (Research & Development) -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage on site for decay	Bulk liquid	Toluene	0.017	F005	I-125	A	10
Industrial -- Research and Development -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage on-site for decay and permanent on-site. Holding to mix for deregulation.	Bulk Liquid	Toluene, Xylene	1.055	F003, F005	H-3, C-14	A	1,000.000
Academic <10,000 students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Teaching lab experiments, not accepted for disposal by vendor	Bulk liquid	Toluene	0.004	F005	H-3, C-14	A	0
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Unable to treat, ship or transfer to broker	Bulk Liquid	Xylene	0.004	U239	S-35	A	0.001
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or H-3 -- (fluids or vials)	Unable to treat, ship, or dispose of waste.	Bulk liquid	Flammable	0.872	D001	H-3, Co-60, Cs-134, Cs-137		11.650

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Unable to treat, ship, or transfer to broker	Bulk Liquid	Naphthalene, Toluene, Xylene	0.039	U165, U220, U239	C-14, H-3	A	0.12
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Used cocktail/pseudicumene; storage for accumulation	Bulk liquid	Xylene, pseudocumene	0.481	F003	H-3	A	4
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Waste from Research activities. Storage on site for decay	Bulk Liquid	Toluene	0.248	F005	S35, Mn54, I125	A	4.5
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	LSC tubes. Lack of treatment facilities	Bulk liquid, un-compacted solids	Acetone, xylene, flammable	0.552	F003, D001	H-3, Co-60, Cs-134, Cs-137	A	0.000
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	No disposal site	Bulk liquids	Mixed solvents	0.774	F003, F005, D022, F001	C-14	A	1700
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for decay to reduce disposal cost, and storage for accumulation to reduce pickup fee and disposal cost	Bulk LS vials	Spent xylene/toluene mixture w/ignit	0.025	F005, F003	P-32, S-35	A	0.1
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for reduced pickup fee	Bulk LS vials	Spent toluene mixture, spent xylene	1.052	F005, F003	H-3, C-14	A	0.56
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Storage for accumulation	Bulk scintillation fluid in vials	Toluene, xylene	0.096	F003, F005	H-3, C-14	A	0.007
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Storage for accumulation	Bulk scintillation fluid in vials	Toluene, xylene	0.038	F003, F005	P-32	A	0.007
Medical (non-federal) Medical college/hospital -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Medical Research. Storage pending disposal	Bulk/vials	Toluene, xylene	0.860	F003, F005	H-3, C-14	A	1.3

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (non-federal) Medical college/hospital -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Medical Research. Storage pending disposal	Bulk/vials	Toluene, xylene	0.287	F003, F005	S-35, Rb-86, P-32	A	0.7
Industrial -- Manufacturing (50-200 employees on site) -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Fluids and vials	Toluene	1.759	F005	H-3	A	10
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	15.0 cu ft -- storage for accumulation	Liquid	Toluene, xylene	0.287	F003, F005	Ca-45	A	0.216
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	4 cu ft laboratories	Liquid	Toluene	0.126	F005	H-3, C-14	A	1.95
Industrial -- Research & Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	50 cu ft. stored for accumulation - No disposal method available shipment probably sent off site	Liquid	Toluene, Xylene	4.655	F005, F003	P-32, I-125, Cr-51	A	5.000
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	7.5 cu ft - - storage for accumulation	Liquid	Toluene, xylene	0.287	F003, F005	H-3, C-14	A	0.006
Industrial -- Manufacturing (<50 employees on site) -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation	Liquid	Toluene	0.246	F005		A	0.1
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation	Liquid		0.021	D001			
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Accumulation	Liquid	Toluene	0.229	F005			
Industrial -- Manufacturing (<50 employees on site) -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Accumulation	Liquid	Toluene	0.246	F005		A	0.1
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation for future treatment off-site	Liquid	Toluene	0.054	F005	C-14	A	0.333
Academic 10,000-20,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation for offsite treatment	Liquid	Xylene	0.096	F003	C-14	A	0.016

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Accumulation for offsite treatment	Liquid	Xylene	0.096	F003	S-35	A	1.5
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation for shipment	Liquid	Xylene	0.312	F003	C-14, H-3	A	0.01
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation for shipment	Liquid	LS Cocktail	0.009		H-3, C-14		0
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation in drum for disposal	Liquid	Toluene	0.063	F005	H-3, C-14	A	0.02
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Accumulation in drum for disposal	Liquid	Toluene	0.021	F005	P-32, S-35	A	0.007
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Flammable	Accumulation, Decay-In-Storage	Liquid	Scintillation Fluid	10.948	D001, F001, F003, F005	C-14, H-3, P-32, I-125, Cl-36, Ca-45, S-35	A	12.940
Government -- Federal (hospital) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Await transfer to incineration - For incineration, on site biodegradables; toluene based - off site disposal	Liquid	Toluene	1.140	F005	H-3, C-14	A	0.200
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Decay prior to shipment	Liquid	Xylene	0.104	F003	C-14, Cr-51	A	0.005
Academic >20,000 students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Decay storage	Liquid	Toluene, xylene	0.153	F005, F003	P-32	A	6
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	For accumulation	Liquid	Xylene, toluene	0.168	F003, F005	H-3, C-14	A	0

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Government -- Federal (hospital)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	In-vitro diagnostic testing. Storage for accumulation - for shipment	Liquid	Toluene	0.291	F005	H-3, C-14	A	0.035
Industrial -- Research and Development -- Conditionally exempt small quantity generator (>100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Laboratory counting procedures, accumulation for shipment	Liquid	Toluene	0.528	F005		A	5
Academic >20,000 students -- No EPA Classification	Liquids Scintillation, containing C14 and tritium - (fluids or vials) - Flammable	Laboratory Counting. Accumulation shipped 4/22/91	Liquid	Xylene, toluene	3.364	F003, F005	H-3, C-14	A	8.5
Academic >20,000 students -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Laboratory counting. Accumulation shipped 4/22/91	Liquid	Xylene, toluene	3.364	F003, F005	I-125, P-32, S-35, Cr-51, Ca-45	A	14.6
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation counting	Liquid	Toluene	3.156				
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Liquid scintillation counting	Liquid	Toluene	1.263				
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Liquid scintillation fluid component, storage for accumulation	Liquid	Toluene, xylene	3.091	F005, F005	H-3, C-14	A	0.55
Medical -- Laboratory (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- flammable	Liquid Scintillation Media	Liquid	Toluene	0.798	F005	H-3	A	1.050
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	National diagonistics, accumulation of LSV waste for future shipment	Liquid	Hydrofluor and/or xylene	0.070			A	0.01
Nuclear Reactor Facility -- Pressurized Water Reactor	Liquid Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	No disposal options. Unable to treat / dispose.	Liquid	Xylene	0.116	U239	Co-60	A	0.000

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic 10,000-20,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On site decay, storage for accumulation	Liquid	Toluene, xylene	3.788	F003, F005	H-3, C-14	A	4.04
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On site, accumulation	Liquid	Toluene	0.191	F005	C-14, H-3	A	1
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On-site accumulation. Accumulation / no approved disposal / treat. available.	Liquid	Scintillation cocktail	0.005	F003	H-3, C-14	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On-site for shipment to licensed vendor for incineration	Liquid	Toluene, xylene	0.029	F005, 5003	H-3	A	0.001
Industrial -- Manufacturing (<50 employees on site) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On-site storage for accumulation	Liquid	Xylene	0.698	F003	H-3	A	10.000
Government -- State - Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Onset storage for accumulation	Liquid	Xylene, toluene	0.010	F003, F005			
Academic 10,000-20,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Onsite storage - storage for accumulation	Liquid		0.042	D001	C-14	A	0
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Quantitation of C-14. Storage for accumulation - for future shipment	Liquid	Toluene	0.011	F005	C-14	A	1.000
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Acetone, toluene, ethyl acetate, methanol	0.004	F003, F005,			
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	Liquid	Xylene, acetone	0.069	F003			
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research Labs. Storage for decay/unable to dispose	Liquid	Methanol, toluene	0.287	F003, F005	H-3, C-14, I-125	A	0

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation cocktails from beta analyses on reactor coolant and waste streams. Accumulation	Liquid	Toluene	0.019	F005	H-3, Ni-63, Sr-89, Sr-90, Fe-55, Mn-54	A	0.000
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation fluid	Liquid	Toluene	0.084	F005			
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C14 and tritium - (fluids or vials) - Flammable	Scintillation fluid, 35S	Liquid	toluene	0.057	F005			
Industrial -- Commercial radiopharmacy -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Scintillation media. Storage for accumulation for future shipment.	Liquid	Xylene, Methanol, Toluene, FP	4.889	F003, F005, D001	H-3, C-14	A	71.000
Industrial -- Commercial radiopharmacy -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Scintillation media. Storage for accumulation for future shipment.	Liquid	Methanol, Toluene, FP <140	0.246	F003, F005, D001	Ca-45	A	0.360
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	Toluene	3.785	F005	C-14	A	4.000
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	14C-Benz (A) Anthracene, Benz (A) anthracene	0.071	U018, U022	C-14		0.005
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	Toluene	0.289	F005	C-14, H-3	A	0
Academic >20,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	Pseudocumene	1.147	D001	Cs-137,Ba-133	A	0.03
Medical (Non-Federal) -- Hospital >750 beds -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	Toluene	0.912	F005	H-3	A	0.200
Academic 10,000-20,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	Toluene	0.021	F005	H-3, C-14		0.5

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	Toluene	0.168	F005	H-3, C-14	A	4.87
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	Toluene	0.249	F005	H-3, C-14	A	22.26
Government -- Federal (hospital)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	Toluene	8.918	F005	H-3, C-14	A	5.000
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid	Toluene, xylene	0.274	F005, F003	H-3, C-14	A	1
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Storage for accumulation	Liquid	Scintillation Fluids	13.424	D001, F001, F003, F005	C-14, H-3	A	2.740
Academic 10,000-20,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation	Liquid	Toluene	0.008	F005	S-35		0.2
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation	Liquid	Toluene, xylene	0.042	F005, F003	S-35, Ca-45	A	0.44
Academic <10,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials) -- S-35	Storage for accumulation	Liquid	Toluene	0.145	F005	S-35	A	0
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - for shipment	Liquid	Toluene	0.698	F005	H-3	A	200.000
Industrial -- Research & Development	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - for shipment	Liquid		0.879	F003, F005	H-3, C-14	A	0.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - for shipment	Liquid	Toluene	2.095	F005	H-3, C-14	A	1.000

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (<50 employees on site) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - future treatment, shipment	Liquid	Flammables	0.791	F003, F005	H-3, C-14	A	0.000
Industrial -- Manufacturing (>200 employees) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation. Laboratory counting procedures.	Liquid	Toluene, Xylene	0.264	F005, F003			
Industrial -- Manufacturing (>200 employees) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Storage for accumulation. Unable to dispose. Laboratory counting procedures.	Liquid	Toluene, Xylene	0.528	F005, F003	Am-241	A	0.000
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for bulking and testing for deregulated amounts - chemical waste	Liquid	Toluene, xylene	0.126	F005	H-3, C-14	A	10
Medical (Non-Federal) -- Hospital 250-750 beds	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for decay	Liquid	Toluene	0.291	F005	I-125	A	0.040
Industrial -- Research and Development -- Conditionally exempt small quantity generator (>100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for decay	Liquid	Toluene	0.528	F005		A	0
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for decay and shipped as chemical waste	Liquid	Toluene, xylene	0.042	F005, F003	P-32	A	10
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for decay of 32P	Liquid	Toluene	0.084	F005	P-32	A	2
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials) -- contains P-32	Storage on site for decay	Liquid	Toluene	0.001	F005	P-32		0.004

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage on site until drum filled - then shipped	Liquid	Toluene	0.002	F005	C-14		0
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Storage on-site for accumulation - for shipment	Liquid	Characteristic	0.074	D001	C-14	A	0.020
Government -- State -- No EPA Classification	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage until disposal capability is available	Liquid	Xylene	0.011	F003	Ni-63, Pm-147	A	0
Nuclear Reactor Facility -- Boiling Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage until future disposal / processing can be obtained	Liquid	Liquid scintillation	0.029	F003	H-3, C-14	A	0.000
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Stored for accumulation	Liquid	Toluene, xylene	17.361	F005, F003	H-3, C-14	A	25.236
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Stored for accumulation	Liquid	Ignitable, toluene, xylene	0.573	D001, F003. F005	P-32, S-35, C-136	A	8.08
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Stored for accumulation	Liquid	Toluene, xylene	3.472	F005, F003	S-35, Na-22, C-136	A	0.292
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Stored for accumulation - for shipment	Liquid	Toluene, Xylene	0.528	F005, F003	C-14, H-3	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Stored on-site pending availability of treatment / disposal ; RCRA permit application in review phase	Liquid	1, 2, 4-trimethyl-benzene	0.007	D001			

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Till large enough volume for disposal	Liquid	Scintillation Fluid	0.001	F005	H-3, C-14	A	4
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Tritium analysis. Storage for treatment on-site	Liquid	Toluene	0.064	F005	H-3	A	0.005
Academic >20,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) - HAZ	Waiting for disposal	Liquid	Toluene, xylene	0.287	F005, F003	H-3	A	31
Industrial -- Manufacturing (<50 employees on site) -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation for disposal	Liquid in Vials	Toluene	0.093	F005	C-14	A	0.010
Academic 10,000-20,000 Students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for decay	Liquid in Vials	Xylene, toluene, naphthalene, dioxane	0.143	F005, F003, U165,U 108	P-32, I-125, S-35, Cr-51	A	0
Academic 10,000-20,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage until incinerated	Liquid in Vials	Xylene, Toluene	0.107	F003, F005	H-3, C-14	A	0
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waiting for shipment pickup	Liquid in Vials	Xylene, Toluene, Pseudocumene	15.360	F003, F005	C-14	A	20.000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid scintillation	Benzo(A)pyrene	0.172	U022			
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Waste from research - Accumulation for future shipment	Liquid Scintillation	Toluene	7.680	F005	H-3, C-14	A	11.000
Government -- Federal (Research & Development) -- Large quantity generator (>1000	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Decay, incineration, accumulation for lower cost	Liquid scintillation fluid		0.999	D001, F003	H-3, C-14, I-125, S-35	A	1
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Lab research/biomedical	Liquid scintillation vials	Toluene, xylene	0.191	F005, F003			

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic <10,000 Students -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)		Liquid Solvent	Scintillation Cocktail	0.071		H-3		0
Academic 10,000-20,000 Students -- Large quantity generator (1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation, to be shipped off site	Liquid vials	Toluene	0.295	F005	C-14	A	0.02
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Biological Waste (Non-infectious)	Laboratory counting procedures	Liquid vials	Trigylcerol	0.191	F005	I-125	A	0.002
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Levels - not acceptable by broker	Liquid vials	Toluene	0.842	F005	H-3, C-14, Ca-45, Cr-51	A	8.9
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	On-site for future disposal	Liquid vials		0.214	D001	H-3, C-14	A	0
Academic 10,000-20,000 Students -- Conditionally exempt small quantity generator	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Specific activity above de minimis levels	Liquid vials	Xylene	1.683	F003	H-3, C-14	A	8.9
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquid vials	Toluene, xylene	0.210	F005, F003	H-3, C-14	A	0.3
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for decay/accumulation	Liquid vials	Toluene, xylene	0.210	F005, F003	P-32, S-35	A	0.1
Industrial -- Research and Development -- No EPA Classification	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation of 1 drum of 202 and 1 drum of 215 until 17th April 1991, when they were dispatched for disposal with similar 1991 waste. Accumulation for future shipment.	Liquid/Vials	Alkorgamine	0.106	D001	C-14	A	0.000
Government -- Federal (Research & Development) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	14C,3H stored onsite until 55 gallon drum filled vials; stored until 30 gallon drum filled - liquid	Vial liquid	Xylene	0.780	F003	H-3	A	1

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic (10,000-20,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation for future shipment	Vials	Acetone, toluene, pseudocumene	0.292	F003, F005, D001	H-3, C-14	A	0.23
Academic (10,000-20,000 students) -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation for future shipment	Vials	Acetone, toluene, pseudocumene	0.287	F003, F005, D001	H-3, C-14, S35	A	0.7
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Storage for accumulation for waste shipment	Vials	Xylene, toluene	0.416	F003, F005			
Academic 10,000-20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Liquids in vials	Toluene, xylene	0.042	F005, F003	H-3	A	0.1
Academic <10,000 Students	Liquids Scintillation, containing C-14 and/or tritium -- (vials)	Research/Counting . Storage for accumulation	LSC Vials	Toluene	0.076	F005	C-14	A	0.00001
Industrial -- Research and Development -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- Flammable	Commercial source, accumulation for shipment	LSV	Trimethylbenzene	0.528				0.06
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Research	LSV	Ignitable	0.267	D001	H-3, C-14		0
Medical (Non-Federal) -- Medical College/Hospital -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials) -- flammable	Storage for accumulation	LSV	Toluene	0.873	F005	H-3, C-14	A	2.154
Medical (Non-Federal) -- Medical College/Hospital -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials) -- Flammable	Storage for accumulation	LSV	Toluene	0.291	F005	S-35	A	0.700
Medical (Non-Federal) -- Medical College/Hospital -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - for shipment	LSV	Xylene, Toluene, Ignitable	0.427	D001, F003, F005	H-3, C-14	A	2.300

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Medical College/Hospital -- Small quantity generator (100-1,000 kg/month)	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - for shipment	LSV	Xylene, Toluene, Ignitable	0.155	D001, F003, F005	S-35, Ca-45	A	5.400
Industrial -- Waste broker/processor	Liquid Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation for future treat/shipment. Liquid scintillation counting.	LSV	Toluene	0.791	F005	H-3, C-14	A	2.530
Industrial -- Waste broker/processor	Liquid Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Storage for accumulation for future treat/shipment. Liquid scintillation counting.	LSV	Toluene	3.913	F005	H-3, C-14, S-35, P-32, I-125, Cl-36	A	14.540
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation	Scintillation	TNT	0.316	D001	C-14	A	0.007
Academic <10,000 students	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Biological Experiments for teaching. Storage for accumulation	Scintillation fluid	Toluene, Dioxane	0.006	F005, U108	H-3, C-14	C	10.5
Academic <10,000 students	Liquids Scintillation, containing radioisotopes other than C-14 and tritium - (fluids or vials)	Biological Experiments for teaching. Storage for accumulation	Scintillation fluid	Toluene	0.006	F005	P-32, S-35	C	10.5
Medical (Non-Federal) -- Medical College/Hospital	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Absorbed aqueous liquid. Storage for accumulation. Comments: Subsequently shipped - Accumulation until next shipment (shipped 2/13/91)	Scintillation Vials	Xylene, Toluene	2.438	F003, F005	H-3, C-14		0.536
Medical (Non-Federal) -- Medical College/Hospital	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Absorbed aqueous liquid. Storage for accumulation. Comments: Subsequently shipped - Accumulation until next shipment (shipped 2/13/91)	Scintillation Vials	Xylene, Toluene	1.219	F003, F005	H-3, P-32, S-35		0.661

Table B-12. LSC waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Research and Development -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Accumulation for future shipment	Scintillation vials	Toluene	0.141	F005	H-3	A	0.5
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Unable to ship	Solidified absorbed	Toluene, xylene	0.001	F003, F005	H-3, C-14	A	0
Industrial -- Research & Development	Liquids Scintillation, containing radioisotopes other than C-14 and/or tritium -- (fluids or vials)	Awaiting shipment for disposal	Solid	Alkylbenzene	0.019	F005	C-14	A	12.100
Industrial -- Manufacturing (<50 employees on site)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation - Ultimate shipment for disposal	Solid	Scintillation Vials	4.189		H-3		0.000
Government -- Federal (Research & Development) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)	Storage for accumulation for waste shipment	Solid/vials solid	Xylene, toluene	1.561	F003, F005			
Academic <10,000 Students -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Scintillation, containing C-14 and/or tritium -- (fluids or vials)		Un-compacted solid	Toluene	0.178	F005	H-3	A	0
Medical (non-federal) - Medical college/hospital	Other (Specify) -- LSC			LSC	0.042				
Medical (non-federal) - Medical college/hospital	Other (Specify) -- LSC			LSC	0.042				
Medical (non-federal) - Medical college/hospital	Other (Specify) -- LSC			LSC	0.004				
Academic	Other (Specify) -- LSC			LSC	0.210				
Academic	Other (Specify) -- LSC				1.263				
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Other (Specify) -- LSC				0.126				

Table B-13. Multi-code waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (50-200 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Aqueous - Absorbed -- Corrosive	On-site storage for accumulation - Unable to ship or dispose of the waste	Bulk Liquid	Corrosive, Lead	1.396	D002, D008	H-3, Sr-90	A	0.001
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Aqueous -- Solidified	Accumulation for lower cost	Liquid		0.250	D001, D002	H-3, S-35	A	200
Academic <10,000 Students -- Small quantity generator (100-1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Unable to dispose of waste due to organic contents	Absorbed liquid	Methanol. benzene, chloroform	0.084	D022, F003	H-3, C-14, Ni-63	A	3175
Academic <10,000 Students -- No EPA Classification	Lead Containing Waste -- Aqueous Liquids	Staining procedures	Liquid	Osmium, lead	0.019	P087, D008	U-238	A	0
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquid Organic - (Solvents, Chlorinated Solvents, etc.) -- Flammable	Storage for accumulation	Liquid	Solvents	0.689	D001, F001, F003, F005	C-14, H-3, S-35	A	7.620
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste solvents from degreasing and maintenance. Stored indefinitely on-site until mixed waste treatment / disposal capability is developed	Bulk liquid	Lead, cadmium, carbon tetrachloride, tetrachloro-ethylene	1.075	D008,D006, D019, D039	Co-60, Cs-137, Fe-55	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)		Bulk liquid	1, 1, 2-trichloro-1, 1, 2-trifluoroethane, 1,1,1-trichloroethane, acetone, toluene, cadmium, chromium, lead	0.349	F002, F003, F005, D006, D007, D008	Co-60, Cs-134, Cs-137	A	0.017
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Paint waste, degreasing, decontamination, cleaning. Accumulation for future treatment.	Liquid	Ignitability, barium, cadmium, chromium, lead, methylene chloride, trichlorotrifluoroethane, ethyl benzene, toluene	4.577	D001, D005, D006, D007, D008, F002, F003, F005	Co-60, Mn-54, Fe-59	A	12.900

Table B-13. Multi-code waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Waiting for treatment technology.	Liquid	Chromate, corrosive, benzene, 1,1,1-Trichloroethane, xylene, toluene	3.705	D007, D002, D018, F002, F003, F005	Co-60, Mn-54	A	0.001
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.)	Mixed waste interim status TSDF awaiting treatment and/or disposal technology	Solvent liquid	Ignitable, reactivity, mercury, barium, lead, chromium, chloroform, I, 1-dichloroethylene, tetrachloroethylene, dichlrorethane, cadmium, methyl ethyl ketone	3.487	D001, D003, D009, D008, D005, D007, D022, D029, D039, D040, D028, D006, D035,	Co-60, Cs-137, Ni-63, Ni-59, Fe-59, Co-58, Fe-55, Mn-54, Sr-90, Nb-95, Tc-99, Cs-134, Sr-89, Pm-147	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Dry cleaning solvents	Dry cleaning bottoms. Lack of treatment facilities	Bulk liquid	1, 1, 2-trichloro-1, 1, 2-trifluoroethane, acetone, barium, cadmium, chromium, lead	0.697	F001, F003, D001, D005, D006, D007, D008	Co-60, Cs-134, Cs-137	A	0.034
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Liquids Organic - (Solvents, chlorinated Solvents, etc.) -- Flammable	Permanent on site storage; storage for treatment; storage for decay	Liquid	Methanol, Acetone, Xylene, Chloroform	2.998	F003, F005, D022	H-3, C-14, P-32, S-35, I-125	A	100
Academic >20,000 students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Unable to treat at this time	Bulk	Chloroform, acetone, hexane, isopropyl ether, methylene chloride	0.032	D002, F003, D001, F002	Co-60, Fe-58, H-3	A	1.02
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Drug metabolism test. Storage awaiting facility capable of safe and legal disposal	Bulk Liquid	Ethanol, Xylene, Toluene, Chloroform, Acetone, Benzene, 2-Methoxyethanol	0.698	D001, D018, D022, F003, F005	C-14	A	1.904
Industrial -- Manufacturing (<50 employees on site) -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	On-site storage for accumulation - For treatment or shipment	Bulk Liquid	Flammable Liquid	3.785	D001, F002, F003, F005	C-14	A	350.000
Industrial -- Manufacturing (>200 employees) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Storage on-site for decay / storage for accumulation. Unable to dispose. Expired product.	Liquid	Corrosivity, Reactivity, EP toxic	3.430	D002, D003, D004-32	H-3, C-14	A	43,000.000
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Maintenance Painting	Liquid	Waste xylene-D002, F003	3.345	D002, F003		A	1

Table B-13. Multi-code waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Benzene, sodium hydroxide	0.004	D018, D002			
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Pyridine, ethyl acetate, acetic acid	0.011	D038, F003, D002			
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Acetone, ethanol, diethyl ether, trichloroacetic acid	0.019	F003, D001, D002			
Industrial -- Manufacturing (>200 employees on site) -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Waste from the manufacture of label compounds, accumulation of waste for future treatment	Liquid	Wastes (methanol, ethyl acetate, xylene, n-hexane, acetone, acetonitrile, ethyl ether, butanol, toluene, benzene, pyridine, methyl ethyl ketone, pentane, acetic acid, tetrahydrofuran, acrylonitrile, cyclohexane	2.886	F003, D001, D018, D038, D035, D002	C-14	A	2036.2
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Uranyl acetate, acetone, sodium hydroxide, lead citrate	0.054	F003, D002, D008	C-14	A	0.65
Academic <10,000 Students	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Methanol, acetic acid, silver	0.042	F003, D003, D011			
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Methanol, chloroform, acetic acid, sulfuric acid	0.001	F003, D022, D002,			
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Chloroform, methanol, hexane, ethyl acetate, acetonitrile	0.054	D022, F003, D001,			
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Petroleum ether, benzene, acetonitrile	0.015	D001, D018			
Academic >20,000 Students -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Research	Liquid	Pyridine, ethyl acetate, hexane, methanol	0.003	D038, F003, D001			

Table B-13. Multi-code waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Medical (Non-Federal) -- Hospital >750 beds -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	For shipment off-site (mixed waste) - Future treatment or shipment unable to ship at this time.	Liquid	Toluene, Methanol, Chloroform	0.054	F005, F003, D022	H-3, C-14	A	20.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Storage on-site for decay	Bulk Liquid	Methanol, Acetic Acid	0.007	D001, F003, D002	S-35	A	0.740
Academic <10,000 Students -- Large quantity generator (>1000 kg/month)	Long T1/2 radioactive liquid	Storage for accumulation, then shipped offsite for disposal	Liquid	Acetone, phenol, acetic acid, TCA, sulfuric acid, chloroform, carbon tetrachloride, toluene, xylene	0.947	D001, F003, D022, D019, D002, U188, F005	S-35, H-3, C-14, Sr.-90, P-32	A	6.664
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint (oil based)	Paint Wastes. Unable to treat, ship, or dispose of waste.	Bulk liquid	Flammable, cadmium, chromium	0.305	D001, D006, D007	H-3, Co-60, Cs-134, Cs-137		33.200
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint/solvent waste. No available treatment	Bulk liquid	MEK non-halogenated flammable -- Paint/solvent waste	11.042	F005, F003, D001	Co-60, Cs-137		0.061
Industrial -- Research & Development -- Large quantity generator (>1,000 kg/month)	Waste oil free from solvent contamination	Waste oil from tracer study. Storage for accumulation - Unable to ship	Liquid	Oil/Sludge	0.465	K051	C-14	A	1.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Solvent-contaminated waste oil	Lack of treatment facilities	Bulk liquid	1, 1, 2-trichloro-1, 1, 2-trifluoroethane, 1,1,1-trichloroethane, acetone, toluene, cadmium, chromium, lead, methylene chloride, xylene, dichlorobenzene	5.405	F001, F003, F005, D006, D007, D008, D027	Co-60, Cs-134, Cs-137	A	0.260
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100-1000 kg/month)	Waste Oils (Seal Oils from pumps for example): Waste oil free from solvent contamination	Cross contamination with halogenated waste & bearing/bushings. Storage for decay / accumulation for future shipment.	Bulk liquid	Halogen waste	3.269	F002, D008	Co-60, Ni-63	A	0.000

Table B-13. Multi-code waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Nuclear fuel cycle other than power reactors -- Large quantity generator (>1000 kg/month)	Waste Oils -- Waste oils free from solvent contamination	Plant maintenance of equipment and vehicles	Liquid	Waste oil-D008, D019, D022	31.095	D008, D019, D022, D001, D039, F001		A	2
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Filter Media -- Dewatered	Processing used oil / solvent mixture for energy / rec. Treatment method not available at this time.	Uncompacted solid	Filter bags	0.218	D008, F001, F002, F008, F005	Co-60, Cs-134, Cs-137	A	0.000
Nuclear Reactor Facility -- Pressurized Water Reactor	Filters, Mechanical (toxic)	No treatment capability	Uncompacted solid	1, 1, 2-trichloro-1, 2, 2-trifluoroethane	0.641	F002, D008, D006	Co-60, Cs-137	A	3.600
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Liquid Aqueous -- Solidified	Storage for generator treatment. Future shipment for treatment.	Liquid	1,1,1-trichloroethane, trichlorofluoroethane, trichlorofluoromethane, methyl ethyl ketone, toluene	1.308	F001, F002, F005	Co-60, Cs-134, Cs-137, Zn-65	A	0.036
Government -- Federal (Research & Development) -- Large quantity generator (>1000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Decay, incineration, accumulation for lower cost	Solid		1.499	D001, D002, D003, F001, F003, F005, U022, U168	H-3, C-14, I-125, S-35	A	3.5
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Biochemistry protein assays. Storage of P-32 contaminated lab trash for decay. Having difficulty disposing of the waste	Uncompacted Solid	Toluene, Granite Salt	2.095	F005, P030	C-14	A	0.415

Table B-14. Miscellaneous waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Industrial -- Manufacturing (50-200 employees on site) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Aqueous -- Absorbed	Manufacturing	Absorbed Aqueous Liquid	Sodium Azide	7.680				
Academic <10,000 Students -- No EPA Classification	Liquids Aqueous -- Absorbed	Research	Absorbed liquid		0.168				
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Aqueous -- Absorbed	Storage for accumulation	Absorbed Liquid		0.141				
Industrial -- Manufacturing (50-200 employees on site) -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Aqueous -- Absorbed	Manufacturing	Absorbed Aqueous Liquid	Sodium Azide	7.680				
Academic <10,000 Students -- No EPA Classification	Liquids Aqueous -- Absorbed	Research	Absorbed liquid		0.168				
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Liquids Aqueous -- Absorbed	Storage for accumulation	Absorbed Liquid		0.141				
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Irradiated Reactor or Pool Components	Storage for generator treatment. Future shipment for treatment.	Liquid	Liquids aqueous (absorbed)	1.090		Co-60, Zn-65, Cs 134, Cs-137	A	0.679
Industrial -- Large quantity generator (>1,000 kg/month)	Other -- (Specify) -- Aqueous Analytical Waste	Storage until solidification	Aqueous		9.568		H-3, U-238, Th-232	A	1.500
Industrial -- Large quantity generator (>1,000 kg/month)	Other -- (Specify) -- Aqueous Analytical Waste		Aqueous		3.503				
Industrial -- Large quantity generator (>1,000 kg/month)	Other -- (Specify) -- Aqueous Analytical Waste		Aqueous		8.020				
Industrial -- Large quantity generator (>1,000 kg/month)	Other -- (Specify) -- Aqueous Analytical Waste		Aqueous		0.306				

Table B-14. Miscellaneous waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Irradiated Reactor or Pool Components	Storage for generator treatment. Future shipment for treatment.	Liquid	Liquids aqueous (absorbed)	1.090		Co-60, Zn-65, Cs 134, Cs-137	A	0.679
Medical (non-Federal) --Research -- Large quantity generator (>1000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.)	Biomedical research	Liquid	Chloroform	0.052	F024			
Industrial -- Manufacturing (<50 employees on site) -- Large quantity generator (>1,000 kg/month)	Other -- (Specify)	On-site storage for accumulation - For shipment or treatment	Bulk Liquid	Hazardous Waste Liquid	5.204		C-14	C	275,000.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Vitrified Ash or Resins		Bulk liquid	Oil and sludge - non hazardous	15.473				
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Other biological waste (Non-infectious)	Plant and animal waste from biological studies. Storage for accumulation - for future shipment	Liquid	Pesticides	0.512		C-14	A	100.000
Industrial -- Sealed Source/Gauge/Instrument User	Other Biological waste (Non-infectious)	Research animals. Not able to dispose of	Bulk Liquid & Uncompacted Solid	Solid	1.396		H-3, C-14		50.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Vitrified Ash or Resins - Waste oils	Storage for analysis and accumulation.	Bulk liquids	Waste oils	1.308		Co-60, Cs-137, Cs-134, Zn-65	A	0.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Solidified Evaporator Bottoms/Concentrates /Sump Sludge	Storage for accumulation - for future shipment	Liquid	Pesticides	0.002		C-14	A	3,000.000
Industrial -- Research & Development -- Small quantity generator (100-1,000 kg/month)	Liquids Aqueous -- Solidified	From biochemical and environmental fate studies. Storage for accumulation - for future shipment	Liquid/Solidified	Pesticides	0.186		C-14	A	100.000

Table B-14. Miscellaneous waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Filter Media -- Solidified	Solidified charcoal filter media from spill cleanup. Stored indefinitely on-site until mixed waste treatment / disposal capability is developed	Solid	Tetrachloro- ethene	3.487		Co-60, Cs-137, Fe-55	A	0.000
Medical (non-Federal) --Research -- Large quantity generator (>1000 kg/month)	Other - (specify) -- Uranium Waste	Electron Microscopy Stain. Storage for accumulation	Solid	Uranyl nitrate/acetate	0.153		U-235, U-238	A	0
Industrial -- Sealed Source/Gauge/Instrument User	Animal carcasses containing C-14 and/or tritium	Research animals. Not able to dispose of	Un-compacted Solid	Carcasses	1.396		H-3		0.000
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Incinerator Ash or Residuals	Combustion Residue of C-14.	Un-compacted Solid	Residue	0.141				
Industrial -- Manufacturing (50-200 employees on site) -- Small quantity generator (100-1000 kg/month)	Radioactive Sealed Sources, Devices, or Gauges	Storage for on site decay	Un-connected solid		0.053			A	0
Academic <10,000 Students -- No EPA Classification	Trash and/or Solid Waste (not lead) -- non-compacted	Research	Solid		0.947				
Academic <10,000 Students	Trash and/or Solid Waste (not lead) -- non-compacted	Clean-up. On site for future disposal	Solid	PPG, rags	0.073		H-3, C-14	A	0
Industrial -- Sealed Source/Gauge/Instrument User	Trash and/or Solid Waste (not lead) -- compacted	Sample prep & lab bench cleanup. Storage for accumulation - Not able to dispose of	Compacted Solid	Trash	1.396		H-3, C-14		10.000
Industrial -- Research & Development	Trash and/or Solid Waste (not lead) -- compacted	Storage for accumulation - Incineration and storage for decay (Iodine only)	Compacted Solid	Trash	0.791		H-3, C-14, I-125, I-131	A	0.000
Industrial -- Research & Development -- Conditionally exempt small quantity generator (<100 kg/month)	Trash and/or Solid Waste (not lead) -- non-compacted	Storage for accumulation	Un-compacted Solid	Contaminated Trash	4.327				

Table B-16. Paint waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint with thinner	Contaminated area painting		Paint with thinner	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint with thinner	Contaminated area painting		Paint with thinner	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint with thinner	Contaminated area painting		Paint with thinner	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint with thinner	Contaminated area painting		Paint with thinner	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint, thinner, alcohol			Paint, thinner, alcohol	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100 1000 kg/month)	Paint: Epoxy-based	Lack of treatment facilities	Bulk liquid	Epoxy paint	0.349		Co-60, Cs-134, Cs-137	A	0.017
Nuclear Reactor Facility -- Pressurized Water Reactor -- Small quantity generator (100 1,000 kg/month)	Paint: Epoxy-based	Storage for accumulation - Unable to treat, ship or dispose	Liquid	Xylene, Toluene	1.090	F003, F005	Co-60	A	0.010
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1,000 kg/month)	Liquids Organic -- (Solvents, Chlorinated Solvents, etc.) -- Flammable	Paint solvent waste	Bulk Liquid	Flammable Solvents	1.613	D001	Co-60		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint (dried)	Storage waiting availability of off site treatment	Solid	Dried paint	0.218		Co-60, Fe-55, Cs 137, Cs-134, Mn 54	A	0.002
Nuclear Reactor Facility -- Pressurized Water Reactor	Paint: Epoxy-based	No disposal options. Unable to treat / dispose.	Solid	Epoxy paint	0.003		Co-60, Cs-137	A	0.000

Table B-16. Paint waste stored as of December 31, 1990.

Facility Description	Physical Description	Process Information	Physical Form	Hazardous Components	Weighted Volume (cubic meters)	EPA Waste Code	Radionuclides	NRC Class	Cumulative Activity (mCi)
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint: Epoxy-based	Permanent on-site storage. Unable to treat.	Solid	Non-halogenated solvents	0.218	F003, F005	Fe-55, Ni-63, Co 60, Nb-95, Cs-137, Cs-134, Co-58, Mn-54	A	0.000
Nuclear Reactor Facility -- Boiling Water Reactor -- Large quantity generator (>1000 kg/month)	Mercury-Containing Waste (paint mixtures)	Storage for generator treatment	Solid	Waste paint and debris	0.654		Co-60, Cs-134, Cs-137, Zn-65	A	0.121
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint: Oil-based	Facility maintenance activities	Solid / liquid	Ignitable liquid	0.029	D001	Co-60, Cs-134, Cs-137		0.000
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint	Contaminated area painting		Paint sludge	0.218				
Nuclear Reactor Facility -- Pressurized Water Reactor -- Large quantity generator (>1000 kg/month)	Paint			Paint, mostly solids	0.218				

Appendices C-1 through C-4

Waste Acceptance Criteria for Mixed Waste Management Facilities

Appendix C1

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

AMENDMENT 17

Pursuant to Tennessee Department of Environment and Conservation Regulations, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules and regulations of the Tennessee Department of Environment and Conservation and orders of the Division of Radiological health, now or hereafter in effect and to any conditions specified below.

LICENSEE	3. License number R-73014-K98 amended in its entirety
Name Diversified Scientific Services, Inc.	4. Expiration date November 30, 1998
Address P.O. Box 863 Kingston, TN 37763	5. File no. R-73014

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or physical form	9. Maximum Radioactivity and/or quantity of material which licensee may possess at any one time.
See Supplementary Sheets		

7. Authorized Use

See Supplementary Sheets

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in item 2. above.

See Supplementary Sheets

For the Commissioner
Tennessee Department of Environment and Conservation

By: _____
DIVISION OF RADIOLOGICAL HEALTH
Robert N. Young
Health Physicist

Date of Issuance November 5, 1993

Page 1 of 10 Pages

CN-0719 (Rev 9-92)
Form RHS 8-7

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 17

SUPPLEMENTARY SHEET

License Number R-73014-K98

6. Radioactive Material (Element and Mass Number)	8. Chemical and/or Physical Form	9. Maximum Radioactive Material Which Licensee May Possess at Any One Time
A. Hydrogen 3	A. Any radioactive material as authorized by this license that contains hazardous constituents as permitted by the RCRA Hazardous Waste Permit (TNHW-024) issued by the State of Tennessee, Division of Solid Waste Management. These constituents may include "D", "U", and "P" categories as specified in the above referenced RCRA Hazardous Waste Permit.	A. The total combined Isotopic activities shall not exceed 10 Curies at any one time.
B. Carbon 14	B. Same as in 8A.	B. See Item 9A.
C. Sulfur 35	C. Same as in 8A.	C. See Item 9A.
D. Chlorine 36	D. Same as in 8A.	D. See Item 9A.
E. Calcium 45	E. Same as in 8A.	E. See Item 9A.
F. Iron 55	F. Same as in 8A.	F. See Item 9A.
G. Iron 59	G. Same as in 8A.	G. See Item 9A.
H. Cesium 137	H. Same as in 8A.	H. See Item 9A.
I. Cobalt 60	I. Same as in 8A.	I. See Item 9A.
J. Cobalt 58	J. Same as in 8A.	J. See Item 9A.
K. Cobalt 57	K. Same as in 8A.	K. See Item 9A.

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

Amendment 17

SUPPLEMENTARY SHEET

Page 3 of 10 Pages License Number R-73014-K98

L. Gadolinium 153	L. Same as in 8A.	L. See Item 9A.
M. Zinc 65	M. Same as in 8A.	M. See Item 9A.
N. Phosphorus 32	N. Same as in 8A.	N. See Item 9A.
O. Phosphorus 33	O. Same as in 8A.	O. See Item 9A.
P. Sodium 22	P. Same as in 8A.	P. See Item 9A.
Q. Rubidium 86	Q. Same as in 8A.	Q. See Item 9A.
R. Mercury 203	R. Same as in 8A.	R. See Item 9A.
S. Indium 111	S. Same as in 8A.	S. See Item 9A.
T. Gallium 67	T. Same as in 8A.	T. See Item 9A.
Manganese 54	U. Same as in 8A.	U. See Item 9A.
V. Scandium 46	V. Same as in 8A.	V. See Item 9A.
W. Selenium 75	W. Same as in 8A.	W. See Item 9A.
X. Cadmium 109	X. Same as in 8A.	X. See Item 9A.
Y. Nickel 63	Y. Same as in 8A.	Y. See Item 9A.
Z. Copper 64	Z. Same as in 8A.	Z. See Item 9A.
AA. Tin 113	AA. Same as in 8A.	AA. See Item 9A.
BB. Tin 119m	BB. Same as in 8A.	BB. See Item 9A.
CC. Iodine 125	CC. Same as in 8A.	CC. See Item 9A.
DD. Iodine 131	DD. Same as in 8A.	DD. See Item 9A.
EE. Bismuth 207	EE. Same as in 8A.	EE. See Item 9A.
FF. Cerium 141	FF. Same as in 8A.	FF. See Item 9A.
GG. Gold 195	GG. Same as in 8A.	GG. See Item 9A.

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF RADIOLOGICAL HEALTH

RADIOACTIVE MATERIAL LICENSE

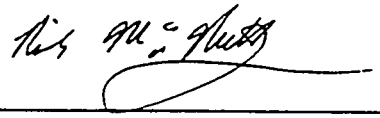
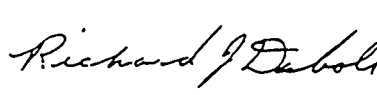
Amendment 17

SUPPLEMENTARY SHEET

Page 4 of 10 Pages License Number R-73014-K98

HH. Any Radioactive Material with Atomic numbers 1 through 83, inclusive, except as in A. and II through RR.	HH. Same as in 8A.	HH. The total combined isotopic activities shall not exceed one (1) Curie at any one time.
II. Cr-51	II. Same as in 8A.	II. 2 Curies
JJ. Cs-134	JJ. Same as in 8A.	JJ. 2 Curies
KK. Tc-99	KK. Same as in 8A.	KK. 2 Curies
LL. Ge-68	LL. Same as in 8A.	LL. 2 Curies
MM. Uranium (not U-233 or U-235)	MM. Same as in 8A.	MM. Total quantity authorized in Items MM. and NN. is 200 kilograms.
NN. Thorium	NN. Same as in 8A.	NN. See Item MM.
OO. Radium	OO. Same as in 8A.	OO. 10 millicuries
PP. Uranium 233	PP. Same as in 8A.	PP. 175 grams (see note 1 below)
QQ. Uranium 235	QQ. Same as in 8A.	QQ. 100 grams (see note 1 below)
RR. Plutonium	RR. Same as in 8A.	RR. 100 grams (see note 1 below)
SS. Americium 241	SS. Same as in 8A.	SS. Total not to exceed 5.0 millicuries.

For Information Only

Date: June 17, 1994		CHEM - NUCLEAR SYSTEMS, INC.
Proprietary ___ Non-Proprietary x		DIVERSIFIED SCIENTIFIC SERVICES INCOPORATED FUEL BLENDING ANALYSIS SPECIFICATION
Prepared By: R. McNutt		
Engineer: R. Devin		
Approved: R.Daboit		Specification Number: ES-S-034 Rev: 2
Quality Assurance K. Morrow		

1.0 SCOPE

This specification provides the analytical requirements for blending of waste fuels at Diversified Scientific Services, Inc (DSSI). Work to be completed includes the analysis of samples of low-level mixed waste for physical, chemical and radioactive properties.

1.1 Purpose

This document specifies the analysis, analytical methods, and minimum acceptable detection limits required for blending of waste fuels.

1.2 Applicability

This specification applies to all laboratories performing analysis for waste fuel blending on materials destined for thermal treatment at DSSI. This specification does not apply to analysis performed to properly characterize waste for disposal. These analyses may be used in the characterization process (see 40 CFR 260, Appendix I) but do not include all analyses or methods which may be needed to properly characterize a waste stream.

1.3 Prerequisites

Samples used in performing these analyses shall be collected in accordance with 40 CFR 261, Appendix I. Samples shall be representative of the entire waste stream not just one or two individual containers. **DO NOT COMBINE WASTE STREAMS.**

1.4 Definitions

"No special requirements."

2.0 REFERENCES

2.1 "Test Methods for Evaluating Solid Waste," 2nd Edition,SW-846, U.S. EPA, July, 1982 (or most recent edition).

2.2 "Standard Methods for the Examination of Water and Waste Water," 15th Edition, American Public Health Association, 1980 (or most recent edition).

2.3 "Annual Book of ASTM Standards," American Society for Testing Materials.

2.4 "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, U.S.EPA (or most recent edition).

3.0 GENERAL REQUIREMENTS

"No special requirements."

4.0 PERFORMANCE AND / OR PERFORMANCE CRITERIA

All analyses must be performed by methods from one of the references provided in Section 2 or other recognized sources. Reference 2.1 is preferred.

5.0 MATERIALS

"No special requirements"

6.0 FABRICATION

"No special requirements"-

7.0 TESTING AND INSPECTION

The following table provides the acceptable limits for the analysis of material to be blended as waste fuel at DSSI. LOQ stands for Limit of Quantification or Practical Quantification Limit.

PARAMETER	UNITS	LOQ	REQUIRED RESOLUTION
Antimony	ppm	2	All metals results should be reported to two decimal places
Arsenic	ppm	1	
Barium	ppm	5	
Beryllium	ppm	1.25	
Cadmium	ppm	1	
Chromium	ppm	0.5	
Lead	ppm	3.5	
Mercury	ppm	1	
Nickel	ppm	5	
Potassium	wt %	0.2	
Selenium	ppm	7.5	
Silver	ppm	1.25	
Sodium	wt %	0.05	
Thallium	ppm	1	

PARAMETER	UNITS	LOQ	REQUIRED RESOLUTION
Polychlorinated Biphenyls (PCB)	ppm	5	+/- 1
Heating Value	btu/lb	2000	+/- 100
Ash	wt %	0.1	+\- 0.1
Water	wt %	2	+/- 0.1
Specific Gravity @ 68°F			+/- 0.01
pH	pH	0.5 - 13.0	+/- 0.5 (10% in water for non-aqueous waste)
Flash Point	°F	68	+/- 2
Physical Description	NA	NA	Description should be in accordance with ASTM Method D 4979
Water Reactivity	yes/no	NA	NA
Flammability	yes/no	NA	NA
Bromine	wt %	0.1	+/- 0.1
Chlorine	wt %	0.1	+/- 0.1
Fluorine	wt %	0.1	+/- 0.1
Iodine	wt %	0.1	+/- 0.1
NOTE: Total halides may be performed in lieu of Bromine and Iodine analyses. Chlorine and Fluorine must be run species specific. If Total Halides are substituted the results must conform to the same LOQ and Resolution.			
Phosphorus	wt %	0.1	+/- 0.1
Sulfur	wt %	0.1	+/- 0.1

PARAMETER	UNITS	LOQ	REQUIRED RESOLUTION
Gamma Spectroscopy			
Be-7	pCi/g	1.6	The percent uncertainty at the 95% confidence level for all gamma spectroscopy analyses shall be equal to, or less than, 120% of the result at the specified detection limits. The percent uncertainty shall decrease to be equal to, or less than, 30% of the result at ten, or more, times the specified detection limits.
Na-22	pCi/g	0.16	
Na-24	pCi/g	0.2	
K-40	pCi/g	3.6	
Cr-51	pCi/g	1.4	
Mn-54	pCi/g	0.2	
Fe-59	pCi/g	0.32	
Co-57	pCi/g	0.2	
Co-58	pCi/g	0.2	
Co-60	pCi/g	0.16	
Zn-65	pCi/g	0.32	
Y-88	pCi/g	0.16	
Zr-95	pCi/g	0.28	
Nb-95	pCi/g	0.2	
Nb-95m	pCi/g	0.56	
Mo-99	pCi/g	1.4	
Ru-103	pCi/g	1.6	
Ru-106	pCi/g	1.6	
Sn-113	pCi/g	0.192	
Sb-124	pCi/g	0.18	
Sb-125	pCi/g	0.48	
Sb-127	pCi/g	0.44	
Te-132	pCi/g	0.16	
I-131	pCi/g	0.18	
I-132	pCi/g	0.42	
I-133	pCi/g	0.2	
I-135	pCi/g	0.8	
Cs-134	pCi/g	0.16	
Cs-136	pCi/g	0.18	
Cs-137	pCi/g	0.2	

PARAMETER	UNITS	LOQ	REQUIRED RESOLUTION
Ba-133	pCi/g	0.24	
Ba-140	pCi/g	0.56	
La-140	pCi/g	0.2	
Ce-141	pCi/g	0.32	
Ce-143	pCi/g	0.32	
Ce-144	pCi/g	1.36	
Nd-147	pCi/g	0.8	
Pm-144	pCi/g	0.18	
Pm-146	pCi/g	0.42	
Pm-149	pCi/g	4.16	
Eu-152	pCi/g	0.84	
Eu-154	pCi/g	0.4	
Eu-155	pCi/g	0.88	
Hg-203	pCi/g	0.18	
Pb-214	pCi/g	0.64	
Bi-212	pCi/g	2.4	
Bi-214	pCi/g	0.32	
Ra-223	pCi/g	0.96	
Ra-224	pCi/g	3.2	
Ra-226	pCi/g	4.8	
Ac-228	pCi/g	0.8	
Th-228	pCi/g	20	
Pa-231	pCi/g	5.6	
Pa-234	pCi/g	1.4	
U-235	pCi/g	0.32	
Np-237	pCi/g	1.8	
Np-239	pCi/g	0.88	
Am-241	pCi/g	0.8	

PARAMETER	UNITS	LOQ	REQUIRED RESOLUTION
Liquid Scintillation Counting			
Tritium	µCi/gm	5e-03	The percent uncertainty at the 95% confidence level for all liquid scintillation analyses shall be equal to, or less than, 150% of the result at the specified detection limits. The percent uncertainty shall decrease to be equal t, or less than, 40% of the result at ten, or more, times the specified detection limits.
Carbon-14	µCi/gm	5e-03	

8.0 PACKAGING AND SHIPPING

"No special requirements."

9.0 QUALITY ASSURANCE

All analysis shall be conducted utilizing Quality Control standards from the applicable reference(s) in Section 2.0.

10.0 DOCUMENTATION

Certified analytical results shall be provided and shall include a listing of the analytical methods used, the source of the each method, the accuracy of each analysis, and the minimum detection limit for each parameter analyzed.

11.0 APPENDICES

"Not applicable"

Wastes Acceptable for Receipt at DSSI

1,1-Dichloroethane	U076
1,1-Dichloroethylene	D029
1,1,1-Trichloroethane	F001/F002/U226
1,1,1,2-Tetrachloroethane	U208
1,1,2-Trichloroethane	F002/U227
1,1,2-Trichloro-1,2,2-trifluoroethane	F001/F002
1,1,2,2-Tetrachloroethane	U209
1,2-Dichloroethane	D028/U077
1,4-Dioxane	U108
2-Butenal (Crotonaldehyde)	U053
2-Ethoxyethanol	F005/U359
2-Nitropropane	F005/U171
2,4-D	D016
2,4-Dinitrotoluene	D030
2,4,5-Trichlorophenol	D041
2,4,5-TP Silvex	D017
2,4,6-Trichlorophenol	D042
Acetaldehyde	U001
Acetone	F003/U002
Acetonitrile	U003
Acetophenone	U004
Acrolein (2-Propenal)	P003
Acrylamide	U007
Aniline	U012
Arsenic	D004
Barium	D005
Benzene	D018/F005/U019
Cadmium	D006
Carbon Disulfide	F005
Carbon Tetrachloride	D019/F001/U211
Chlordane	D020
Chlorobenzene	D021/F002/U037

Wastes Acceptable for Receipt at DSSI

Chloroform (Trichloromethane)	D022/U044
Chromium	D007
Cresol	D026/U052
Cresylic acid	F004
Cumene	U055
Cyclohexane	U056
Cyclohexanone	F003/U057
Dichloroisopropyl Ether (2,2"-Oxy bis-2-chloropropane)	U027
Dipropylamine	U110
Endrin	D012
Ethyl Benzene	F003
Ethyl Ether	F003/U117
Ethyl Acetate	F003/U112
Formaldehyde	U122
Furan	U124
Heptachlor and its hydroxide	D031
Hexachlorobenzene	D032
Hexachlorobutadiene	D033
Hexachloroethane	D034
Isobutyl alcohol	F005/U140
Lead	D008
Lindane	D013
m-Cresol	F004/U052/D024
m-Dichlorobenzene (1,3-Dichlorobenzene)	U071
m-Xylene	F003/U239/D001
Mercury	D009
Methanol	F003/U154
Methoxychlor	D014
Methyl Bromide (Bromomethane)	U029
Methylene Bromide	U068
Methylene Chloride (Dichloromethane)	F001/F002/U080
Methyl Ethyl Ketone (MEK)	F005/U159/D035

Wastes Acceptable for Receipt at DSSI

Methyl Isobutyl Ketone (MIBK)	F003/U161
n-Butyl alcohol	F003/U031
Naphthalene	U165
Nicotine	P075
Nitrobenzene	F004/U169/D036
o-Cresol	F004/U052/D023
o-Dichlorobenzene (1,2-Dichlorobenzene)	F002/U070
o-Toluidine	U328
o-Xylene	F003/U239/D001
p-Cresol	F004/U052/D025
p-Dichlorobenzene (1,4-Dichlorobenzene)	U072/D027
p-Toluidine	U353
p-Xylene	F003/U239/D001
Pentachlorophenol	D037
Propylene Dichloride (1,2-Dichloropropane)	U083
Pyridine	F005/U196/D038
Selenium	D010
Silver	D011
Spent Solvents	F001/F002/F003/F004/F005
Tetrachloroethylene	F001/F002/U210/D039
Tetrahydrofuran	U213
Toluene	F005/U220
Toxaphene	D015
Trichloroethylene	F001/F002/U228/D040
Trichloromonofluoromethane	F002/U121
Tris (2,3 Dibromopropyl) Phosphate	U235
Unlisted Ignitable Waste	D001
Unlisted Corrosive Waste (SEE NOTE 1)	D002
Vinyl Chloride	D043

Note 1: DSSI is permitted for storage only for D002 waste. At this time DSSI is not accepting any material which meets the EPA definition of a D002 waste.

Appendix C2

STATE OF UTAH PLAN APPROVAL
Permittee:
Envirocare of Utah, Inc.
Tooele County, Utah
EPA Identification Number UTD982598898

Pursuant to the Utah Solid and Hazardous Waste Act, (the Act), 26-14-1, et. seq., Utah Code Annotated 1953, as amended and the Utah Administrative Code (UAC) (R450-1 through R450-13 and R450-50) as adopted by the Utah Solid and Hazardous Waste Committee, (the Committee), a plan approval (herein after called "permit") is issued to Envirocare of Utah, Inc. (hereafter called the "Permittee"), to operate a hazardous waste treatment and storage facility in Tooele County, Utah, at latitude 40o 41' 000" North and longitude 113o 06' 030" West. The U.S. Environmental Protection Agency (U.S. EPA) has authorized the Executive Secretary to issue such a permit under Section 3006(b) of the Resource Conservation and Recovery Act (RCRA).

The Permittee must comply with all the terms and conditions of this permit. The permit consists of the conditions contained herein (including the portions of the application attached and incorporated by reference), and the applicable portions of R450-1 through R450-13, R450-50, and R450-101 contained in the permit. Applicable rules are those which are in effect on the date of issuance of this permit.

This permit is based on the premise that the information submitted in the application dated July 22, 1987 as modified by subsequent amendments dated April 25, 1988 and July 25, 1989 (hereafter referred to as the application), is accurate and that the facility will be operated as specified in the referenced portions of the application, except as modified by the conditions herein. Portions of the application are attached and incorporated herein by reference, wherever noted, as part of this permit. Any inaccuracies or misrepresentations found in the application may be grounds for the termination or modification of this permit (see R450-3-9.). The Permittee must inform the Executive Secretary of any deviation from or changes in the information in the application which would affect the Permittee's ability to comply with the applicable regulations or permit conditions.

This permit is effective as of November 30, 1990 and shall remain in effect until November 30, 2000, unless revoked and reissued (R450-3-9.1(a)(b)(c)) or terminated (R450-3-9.2.), or continued in accordance with R450-3-5(d).

Signature: _____ Date: 11/30/90

Dennis R. Downs
Executive Secretary
Utah Solid and Hazardous Wastes Committee

NOTE TO ENVIROCARE'S PART B PERMIT CERTIFICATE:

The Envirocare site is licensed by the Utah Bureau of Radiation Control for disposal of radioactive waste. The site is also licensed by the Utah Bureau of Radiation Control and permitted by the Utah Bureau of Solid and Hazardous Waste for disposal of "mixed" (hazardous/radioactive) waste.

Any one wishing to visit the site should contact the Permittee to make arrangements for a site tour and to determine that all safety requirements are met prior to entering the site.

Inspectors who will have extensive contact with the site should contact both the Utah Bureau of Radiation Control and the Utah Bureau of Solid and Hazardous Waste to determine that all safety requirements i.e. safety equipment, safety training, and/or physical, are met prior to entering the site.

ENVIROCARE OF UTAH, INC.
HAZARDOUS WASTE LIST

RCRA Wastes

EPA Waste No.		Hazard Code
D001	Ignitability	(I)
D002	Corrosivity	(C)
D003	Reactivity	(R)
D004	Arsenic	(E)
D005	Barium	(E)
D006	Cadmium	(E)
D007	Chromium	(E)
D008	Lead	(E)
D009	Mercury	(E)
D010	Selenium	(E)
D011	Silver	(E)
D012	Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8-dimethano naphthalene)	(E)
D013	Lindane (1,2,3,4,5,6, hexa-chloro-cyclohexane, gamma isomer)	(E)
D014	Methoxychlor (1,1,1-Trichloro-2,2-bis[p-methoxyphenyl]ethane)	(E)
D015	Toxaphene ($C_{10}H_{10}Cl_8$, technical chlorinated camphene, 67-69 percent chlorine)	(E)
D016	2,4-D (2,4-dichlorophenoxyacetic acid)	(E)
D017	2,4,5-TP (Silvex) (2,4,5-trichloro-phenoxypropionic acid)	(E)
D018	Benzene	(E)
D019	Carbon Tetrachloride	(E)
D020	Chlordane	(E)
D021	Chlorobenzene	(E)
D022	Chloroform	(E)
D023	o-Cresol	(E)

ENVIROCARE OF UTAH, INC.
HAZARDOUS WASTE LIST
(continued)

D024	m-Cresol	(E)
D025	p-Cresol	(E)
D026	Cresol	(E)
D027	1,4-Dichlorobenzene	(E)
D028	1,2-Dichloroethane	(E)
D029	1,1-Dichloroethylene	(E)
D030	2,4-Dinitrotoluene	(E)
D031	Heptachlor (and its hydroxide)	(E)
D032	Hexachlorobenzene	(E)
D033	Hexachlorobutadiene	(E)
D034	Hexachloroethane	(E)
D035	Methyl Ethyl Ketone	(E)
D036	Nitrobenzene	(E)
D037	Pentachlorophenol	(E)
D038	Pyridine	(E)
D039	Tetrachloroethylene	(E)
D040	Trichloroethylene	(E)
D041	2,4,5-Trichlorophenol	(E)
D042	2,4,6-Trichlorophenol	(E)
D043	Vinyl Chloride	(E)

HAZARDOUS WASTE FROM NON-SPECIFIC SOURCES:

F001 The following spent halogenated solvents used in degreasing:

Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004 and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.

F002 The following spent halogenated solvents:

Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1.1.2-trichloro-1,2,2-triflouroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; and all spent solvent mixtures/ blends containing, before use, a total of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.

ENVIROCARE OF UTAH, INC.
HAZARDOUS WASTE LIST
(continued)

F003 The following spent non-halogenated solvents:

Xylene, acetone, ethyl acetate,ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.

F004 The following spent non-halogenated solvents:

Cresols and cresylic acid, nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent of more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.

F005 The following spent non-halogenated solvents:

Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, and pyridine; benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.

F006 Waste-water treatment sludges form electroplating operations except from the following processed: (1) Sulfuric acid anodizing for aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.

F007 Spent cyanide plating bath solutions from electroplating operations.

ENVIROCARE OF UTAH, INC.
HAZARDOUS WASTE LIST
(continued)

F008 Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.

F009 Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.

F010 Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.

F011 Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.

F012 Quenching waste water treatment sludges from metal heat treating operations where cyanides are used in the process.

F019 Waste-water treatment sludges from the chemical conversion coating of aluminum.

F024 Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of cerrtain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to an including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in 261.31 or 261.32.)

F028 Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026 and F027.

F039 Multi-Source Leachate

HAZARDOUS WASTE FROM SPECIFIC SOURCES:

K011 Bottom stream from the wastewater stripper in the production of acrylonitrile.

K013 Bottom stream from the acetonitrile column in the production of acrylonitrile.

K050 Heat Exchanger Bundle Cleaning Sludge from the petroleum refining industry.

K051 API separator sludge from the petroleum refining industry.

K052 Tank bottoms (leaded) from the petroleum refining industry.

K061 Emission control dust/sludge from the primary production of steel in electric furnaces.

K069 Emission control dust/sludge from the secondary lead smelting.

ENVIROCARE OF UTAH, INC.
HAZARDOUS WASTE LIST
(continued)

DISCARDED COMMERCIAL CHEMICAL PRODUCTS, OFF-SPECIFICATION SPECIES, CONTAINER RESIDUES, AND SPILL RESIDUES:

P002	1-Acetyl-2-Thiourea	H
P003	Acrolein	H
P004	Aldrin	H
P005	Allyl Alcohol	H
P010	Arsenic Acid	H
P011	Arsenic Pentoxide	H
P012	Arsenic Trioxide	H
P013	Barium Cyanide	H
P014	Benzenethiol	H
P015	Beryllium Dust	H
P017	Bromoacetone	H
P020	Dinoseb	H
P021	Calcium Cyanide	H
P022	Carbon Disulfide	H
P024	p-Chloroaniline	H
P027	3-Chloropropionitrile	H
P028	Benzyl Chloride	H
P029	Copper Cyanide	H
P030	Cyanides (soluble cyanide salts), n.o.s.	H
P034	2-Cyclohexyl-4,6-Dinitrophenol	H
P037	Dieldrin	H
P039	Disulfoton	H
P046	alpha, alpha-Dimethylphenethylamine	H
P047	4,6-Dinitro-2-Methylphenol	H
P048	2,4-Dinitrophenol	H
P050	Endosulfan	H
P051	Endrin	H
P056	Fluorene	H
P059	Heptachlor	H
P060	Isodrin	H
P071	Methyl Parathion	H
P074	Nickel Cyanide	H
P075	Nicotine & Salts	H
P077	p-Nitroaniline	H
P082	N-Nitrosodimethylamine	H
P085	Octamethylpyrophosphoramide	H
P089	Parathion	H
P094	Phorate	H
P097	Famphur	H
P098	P - [illegible]ium Cyanide	H
P099	P - [illegible]ium Silver Cyanide	H
P101	Propanenitrile	H
P102	Propargyl Alcohol	H
P104	Silver Cyanide	H
P105	Sodium Azide	H

ENVIROCARE OF UTAH, INC.
HAZARDOUS WASTE LIST
(continued)

DISCARDED COMMERCIAL CHEMICAL PRODUCTS, OFF-SPECIFICATION SPECIES, CONTAINER RESIDUES, AND SPILL RESIDUES (continued):

P106	Sodium Cyanide	H
P107	Strontium Sulfide	H
P108	Strychnine & Salts	H
P111	Tetraethyl Pyrophosphate	H
P113	Thallium (III) Oxide	H
P114	Thallium Selenite	H
P115	Thallium (I) Sulphate	H
P119	Ammonium Vanadate	H
P120	Vanadium (V) Oxide	H
P121	Zinc Cyanide	H
P122	Zinc Phosphide (>10%)	H
P123	Toxaphene	H

COMMERCIAL CHEMICAL PRODUCTS, MANUFACTURING CHEMICAL INTERMEDIATES, OR OFF-SPECIFICATION COMMERCIAL CHEMICAL PRODUCTS:

U002	Acetone	I
U003	Acetonitrile	I,T
U004	Acetophenone	T
U005	2-Acetylaminoflourene	T
U007	Acrylamide	T
U009	Acrylonitrile	T
U012	Aniline	I,T
U018	Benzo(a)anthracene	T
U019	Benzene	T
U021	Benzidine	T
U022	Benzo(a)pyrene	T
U027	Bis(2-chloroisopropyl)ether	T
U028	Bis(2-Ethylhexyl) Phthalate	T
U029	Bromomethane	T
U030	4-Bromophenyl Phenyl Ether	T
U031	n-Butyl Alcohol	I
U032	Calcium Chromate	T
U036	Chlordane	T
U037	Chlorobenzene	T
U038	Chlorobenzilate	T
U039	4-Chloro-3-methyl Phenol	T
U041	Epichlorohydrin	T
U042	2-Chloroethylvinyl Ether	T
U043	Vinyl Chloride	T
U044	Chloroform	T
U045	Chloromethane	T
U047	2-Chloronaphthalene	T

Revised March 1993

ENVIROCARE OF UTAH, INC.
HAZARDOUS WASTE LIST
(continued)

U048	2-Chlorophenol	T
U050	Chrysene	T
U052	Cresols/Cresylic Acid	T
U056	Cyclohexane	I
U057	Cyclohexanone	I
U060	DDD	T
U061	DDT	T
U062	Diallate	T
U063	Dibenz(a,h)anthracene	T
U064	Dibenzo(a,i)pyrene	T
U066	1,2-Dibromo-3-Chloropropane	T
U067	1,2-Dibromoethane	T
U068	Dibromomethane	T
U069	Di-n-Butylphthalate	T
U070	o-Dichlorobenzene	T
U071	m-Dichlorobenzene	T
U072	P-Dichlorobenzene	T
U073	3-3'-Dichlorobenzidine	T
U074	1,4-Dichloro-2-Butene	I,T
U075	Dichlorodifluoroethane	T
U076	1,1-Dichloroethane	T
U077	1,2-Dichloroethane	T
U078	1,1-Dichloroethylene	T
U079	1,2-Dichloroethylene	T
U080	Methylene Chloride	T
U081	2,4-Dichlorophenol	T
U082	2,6-Dichlorophenol	T
U083	1,2-Dichloropropane	T
U084	1,3-Dichloropropene	T
U085	1,2:3,4-Diepoxybutane	I,T
U088	Diethylphthalate	T
U089	Diethylstilbesterol	T
U091	3,3'-dimethoxybenzidine	T
U093	Dimethylaminoazobenzene	T
U094	7,12-Dimethylbenz(a)anthracene	T
U095	3,3'-Dimethylbenzidine	T
U101	2,4-Dimethylphenol	T
U102	Dimethylphthalate	T
U105	2,4-Dinitrotoluene	T
U106	2,6-Dinitrotoluene	T
U107	Di-n-Octyl Phthalate	T
U108	1,4-Dioxane	T
U109	1,2-Diphenylhydrazine	T
U112	Ethyl Acetate	I
U115	Ethylene Oxide	I,T
U117	Ethyl Ether	I
U118	Ethyl Methacrylate	T
U119	Ethylmethane Sulfonate	T

ENVIROCARE OF UTAH, INC.
HAZARDOUS WASTE LIST
(continued)

U120	Fluoranthene	T
U121	Trichlorofluoromethane	T
U122	Formaldehyde	T
U123	Formic Acid	C,T
U127	Hexachlorobenzene	T
U128	Hexachlorobutadiene	T
U129	Lindane (Hexachlorocyclohexane)	T
U130	Hexachlorocyclopentadiene	T
U131	Hexachloroethane	T
U132	Hexachlorophene	T
U133	Hydrazine	R,T
U134	Hydrofluoric Acid	C,T
U135	Hydrogen Sulfide	T
U137	Indeno(1,2,3-cd)pyrene	T
U138	Iodomethane	T
U140	Isobutyl Alcohol	I,T
U141	Isosafrole	T
U142	Kepone	T
U144	Lead Acetate	T
U145	Lead Phosphate	T
U146	Lead Subacetate	T
U147	Maleic Anhydride	T
U149	Malononitrile	T
U151	Mercury	T
U152	Methacrylonitrile	I,T
U154	Methanol	I
U155	Methapyrilene	T
U157	3-Methylcholanthrene	T
U158	4,4'-Methylene Bis(2-Chloroaniline)	T
U159	Methyl Ethyl Ketone	I,T
U161	Methyl Isobutyl Ketone	I
U162	Methyl Methacrylate	I,T
U165	Naphthalene	T
U166	1,4-Naphthalenedione	T
U167	1-Naphthylenamine	T
U168	2-Naphthylenamine	T
U169	Nitrobenzene	I,T
U170	4-Nitrophenol	T
U171	2-Nitropropane	I,T
U172	N-Nitroso-di-n-butylamine	T
U174	N-Nitrosodiethylamine	T
U179	N-Nitrosopiperidine	T
U180	N-Nitrosopyrrolidine	T
U181	5-Nitro-o-Toluidine	T
U182	Paraldehyde	T
U183	Pentachlorobenzene	T
U184	Pentachloroethane	T
U185	Pentachloronitrobenzene	T

ENVIROCARE OF UTAH, INC.
HAZARDOUS WASTE LIST
(continued)

U187	Phenacetin	T
U188	Phenol	T
U190	Phthalic Anhydride	T
U191	2-Picoline	T
U192	Pronamide	T
U194	1-Propanamine	I,T
U196	Pyridine	T
U197	p-Benzoquinone	T
U201	Resorcinol	T
U203	Safrole	T
U204	Selenium Dioxide	T
U205	Selenium Sulfide	T
U207	1,2,4,5-Tetrachlorobenzene	T
U208	1,1,1,2-Tetrachloroethane	T
U209	1,1,2,2-Tetrachloroethane	T
U210	Tetrachloroethylene	T
U211	Carbon Tetrachloride	T
U212	2,3,4,6-Tetrachlorophenol	T
U214	Thallium (I) Acetate	T
U215	Thallium (II) Carbonate	T
U216	Thallium (I) Chloride	T
U217	Thallium (I) Nitrate	T
U219	Thiourea	T
U220	Toluene	T
U221	Toluenediamine	T
U223	Toluene Diisocyanate	R,T
U225	Bromoform	T
U226	1,1,1-Trichloroethane	T
U227	2-Ethoxyethanol	T
U228	Trichloroethylene	T
U230	2,4,5-Trichlorophenol	T
U231	2,4,6-Trichlorophenol	T
U232	2,4,5-T	T
U233	2,4,5-TP Silvex	T
U234	1,3,5-Trinitrobenzene	R,T
U235	Tris(2,3-Dibromopropyl) Phosphate	T
U237	Uracil mustard	T
U238	Ethyl Carbamate (Urethane)	T
U239	Xylene	I
U240	2,4-Dichlorophenoxyacetic acid	T
U242	Pentachlorophenol	T
U243	Hexachloropropene	T
U247	Methoxychlor	T
U328	2-Methyl Benzenamine	T
U359	1,1,2-Trichloroethane	T

(Note: Non-radioactive hazardous wastes must not be mixed with radioactive wastes to avoid or circumvent the land disposal restrictions.)

DRC-05-0/69

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE

Pursuant to Section 19-3-104 of the Utah Code Annotated 1953, and the Utah Department of Environmental Quality Rules for the . . . of Ionizing Radiation, and in reliance of statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material designated below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, and orders now or hereafter in effect and to any conditions specified below.

LICENSEE			
1. Name	Envirocare of Utah, Inc.	3. License Number	UT 2300249 Amendment #14, in its entirety (Amend #19 11-16-94)
2. Address	46 West Broadway Suite 240 Salt Lake City, Utah 84101	4. Expiration Date	February 28, 1996
		5. License Category	4-a

6. Radioactive Material (Element and Mass Number)	7. Chemical and/or Physical Form	8. Maximum Average Concentration In Waste for Disposal
A. Silver-110m	A. Volumetric bulky materials or debris	A. 5.6E+02 pCi/g
B. Americium-241	B. Volumetric bulky materials or debris	B. 2.3E+02 pCi/g
C. Americium-243	C. Volumetric bulky materials or debris	C. 1.7E+03 pCi/g
D. Beryllium-7	D. Volumetric bulky materials or debris	D. 3.8E+04 pCi/g
E. Calcium-45	E. Volumetric bulky materials or debris	E. 4.0E+08 pCi/g
F. Cadmium-109	F. Volumetric bulky materials or debris	F. 4.6E+04 pCi/g
G. Cobalt-56	G. Volumetric bulky materials or debris	G. 3.6E+02 pCi/g
H. Cobalt-57	H. Volumetric bulky materials or debris	H. 1.9E+04 pCi/g

See Attached

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UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #14

6. Radioactive Material (Element and Mass Number)		7. Chemical and/or Physical Form		8. Maximum Average Concentration In Waste for Disposal	
I.	Cobalt-58	I.	Volumetric bulky materials or debris	I.	1.6E+03 pCi/g
J.	Cobalt-60	J.	Volumetric bulky materials or debris	J.	3.6E+02 pCi/g
K.	Chromium-51	K.	Volumetric bulky materials or debris	K.	6.8E+04 pCi/g
L.	Cesium-134	L.	Volumetric bulky materials or debris	L.	1.2E+03 pCi/g
M.	Cesium-137	M.	Volumetric bulky materials or debris	M.	5.6E+02 pCi/g
N.	Europium-152	N.	Volumetric bulky materials or debris	N.	1.7E+03 pCi/g
O.	Europium-154	O.	Volumetric bulky materials or debris	O.	1.4E+03 pCi/g
P.	Iron-55	P.	Volumetric bulky materials or debris	P.	1.8E+06 pCi/g
Q.	Mercury-203	Q.	Volumetric bulky materials or debris	Q.	1.0E+04 pCi/g
R.	Potassium-40	R.	Volumetric bulky materials or debris	R.	1.0E+04 pCi/g
S.	Iridium-192	S.	Volumetric bulky materials or debris	S.	2.5E+03 pCi/g

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
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License # UT 2300249
Amendment #14

6. Radioactive Material (Element and Mass Number)		7. Chemical and/or Physical Form		8. Maximum Average Concentration In Waste for Disposal	
T.	Manganese-54	T.	Volumetric bulky materials or debris	T.	5.6E+03 pCi/g
U.	Niobium-94	U.	Volumetric bulky materials or debris	U.	1.6E+02 pCi/g
V.	Nickel-59	V.	Volumetric bulky materials or debris	V.	7.0E+02 pCi/g
W.	Nickel-63	W.	Volumetric bulky materials or debris	W.	2.0E+06 pCi/g
X.	Lead-210	X.	Volumetric bulky materials or debris	X.	2.3E+05 pCi/g*
Y.	Polonium-210	Y.	Volumetric bulky materials or debris	Y.	2.0E+04 pCi/g
Z.	Radium-226	Z.	Volumetric bulky materials or debris	Z.	2.0E+03 pCi/g*
AA.	Radium-228	AA.	Volumetric bulky materials or debris	AA.	1.8E+03 pCi/g
BB.	Radium-228 1 year	BB.	Volumetric bulky materials or debris	BB.	1.2E+03 pCi/g*
CC.	Radium-228 5 years	CC.	Volumetric bulky materials or debris	CC.	6.7E+02 pCi/g*
DD.	Radium-228 10 years	DD.	Volumetric bulky materials or debris	DD.	5.6E+02 pCi/g*

* Daughters are assumed to be present at same concentration in equilibrium.

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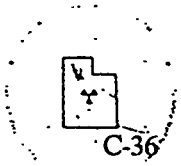
6. Radioactive Material (Element and Mass Number)		7. Chemical and/or Physical Form		8. Maximum Average Concentration In Waste for Disposal	
EE.	Ruthenium-106	EE.	Volumetric bulky materials or debris	EE.	1.9E+04 pCi/g*
FF.	Antimony-124	FF.	Volumetric bulky materials or debris	FF.	7.9E+02 pCi/g
GG.	Antimony-125	GG.	Volumetric bulky materials or debris	GG.	5.3E+03 pCi/g
HH.	Tin-113	HH.	Volumetric bulky materials or debris	HH.	7.3E+05 pCi/g
II.	Strontium-90	II.	Volumetric bulky materials or debris	II.	2.0E+04 pCi/g
JJ.	Thorium-230	JJ.	Volumetric bulky materials or debris	JJ.	1.5E+04 pCi/g
KK.	Thorium-232	KK.	Volumetric bulky materials or debris	KK.	6.8E+02 pCi/g*
LL.	Uranium-234	LL.	Volumetric bulky materials or debris	LL.	3.7E+04 pCi/g
MM.	Uranium-235	MM.	Volumetric bulky materials or debris	MM.	7.7E+02 pCi/g
NN.	Uranium-236	NN.	Volumetric bulky materials or debris	NN.	3.6E+04 pCi/g
OO.	Uranium-238	OO.	Volumetric bulky materials or debris	OO.	2.8E+04 pCi/g

*Daughters are asumed to be present at same concentrations in equilibruim.



UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
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License # UT 2300249
Amendment #14

6. Radioactive Material (Element and Mass Number)	7. Chemical and/or Physical Form	8. Maximum Average Concentration In Waste for Disposal
PP. Uraniuum-natural	PP. Volumetric bulky materials or debris	PP. 1.8E+04 pCi/g
QQ. Uranium-depleted	QQ. Volumetric bulky materials or debris	QQ 1.1E+05 pCi/g
RR. Zinc-65	RR. Volumetric bulky materials or debris	RR. 1.1E+04 pCi/g
SS. Carbon-14	SS. Volumetric bulky materials or debris	SS. 4.0E+05 pCi/g
TT. Hydrogen-3	TT. Volumetric bulky materials or debris	TT. 2.0E+07 pCi/g
JU. Iodine-129	UU. Volumetric bulky materials or debris	UU. 3.1E+03 pCi/g
VV. Sodium-22	VV. Volumetric bulky materials or debris	VV. 7.8E+02 pCi/g
WW. Technetium-99	WW. Volumetric bulky materials or debris	WW. 1.0E+05 pCi/g
XX. Curium-242	XX. Volumetric bulky materials or debris	XX. 1.4E+06 pCi/g
YY. Curium-242	YY. Volumetric bulky materials or debris	YY. 8.1E+03 pCi/g*
ZZ. Curium-243	ZZ. Volumetric bulky materials or debris	ZZ. 1.5E+03 pCi/g

* Daughters are assumed to be present at same concentrations in equilibrium.

UTAH DIVISION OF RADIATION CONTROL
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License # UT 2300249
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6. Radioactive Material (Element and Mass Number)	7. Chemical and/or Physical Form	8. Maximum Average Concentration In Waste for Disposal
AAA. Curium-243	AAA. Volumetric bulky materials or debris	AAA. 1.3E+03 pCi/g*
BBB. Curium-244	BBB. Volumetric bulky materials or debris	BBB. 1.0E+04 pCi/g
CCC. Curium-244	CCC. Volumetric bulky materials or debris	CCC. 7.4E+03 pCi/g*
DDD. Neptunium-237	DDD. Volumetric bulky materials or debris	DDD. 2.0E+03 pCi/g
EEE. Plutonium-238	EEE. Volumetric bulky materials or debris	EEE. 1.0E+04 pCi/g
FFF. Plutonium-238	FFF. Volumetric bulky materials or debris	FFF. 8.2E+03 pCi/g*
GGG. Plutonium-239	GGG. Volumetric bulky materials or debris	GGG. 9.9E+03 pCi/g
HHH. Plutonium-240	HHH. Volumetric bulky materials or debris	HHH. 1.0E+04 pCi/g
III. Plutonium-241	III. Volumetric bulky materials or debris	III. 3.5E+05 pCi/g
JJJ. Plutonium-241	JJJ. Volumetric bulky materials or debris	JJJ. 1.1E+03 pCi/g*
KKK. Plutonium-242	KKK. Volumetric bulky materials or debris	KKK. 1.0E+04 pCi/g

* Daughters are assumed to be present at same concentrations in equilibrium.

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #15

nvirocare of Utah, Inc.
5 West Broadway, Suite 240
alt Lake City, Utah 84101

In accordance with submittal dated September 9, 1993, radioactive material license number UT 2300249 is nended as follows:

TEMS 6, 7, AND 8:

****

6. Radioactive Material (element and mass number)	7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
A1. Americium-241	A1. through WW. inclusive. Volumetric bulky soil or soil-like materials or debris	A1. 2.3E02 pCi/g
A2. Americium-243		A2. 1.7E03 pCi/g
B1. Antimony-124		B1. 7.9E02 pCi/g
B2. Antimony-125		B2. 5.3E03 pCi/g
C. Barium-133		C. 4.0E03 pCi/g
D. Beryllium-7		D. 3.8E04 pCi/g
E. Cadmium-109		E. 4.6E04 pCi/g
F. Calcium-45		F. 4.0E08 pCi/g
G. Carbon-14		G. 4.0E05 pCi/g
H1. Cerium-139		H1. 2.0E03 pCi/g
H2. Cerium-141		H2. 4.0E03 pCi/g
H3. Cerium-144		H3. 4.0E03 pCi/g*

aughters are assumed to be present at same concentrations in equilibrium.

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #15

6. Radioactive Material (element and mass number)	7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
I1. Cesium-134		I1. 1.2E03 pCi/g
I2. Cesium-135		I2. 5.0E02 pCi/g
I3. Cesium-137		I3. 5.6E02 pCi/g
J. Chromium-51		J. 6.8E04 pCi/g
K1. Cobalt-56		K1. 3.6E02 pCi/g
K2. Cobalt-57		K2. 1.9E04 pCi/g
K3. Cobalt-58		K3. 1.6E03 pCi/g
K4. Cobalt-60		K4. 3.6E02 pCi/g
L. Copper-67		L. 2.0E03 pCi/g
M1. Curium-242		M1. 1.4E06 pCi/g
M2. Curium-242		M2. 8.1E03 pCi/g*
M3. Curium-243		M3. 1.5E03 pCi/g
M4. Curium-243		M4. 1.3E03 pCi/g*
M5. Curium-244		M5. 1.0E04 pCi/g
M6. Curium-244		M6. 7.4E03 pCi/g*
N1. Europium-152		N1. 1.7E03 pCi/g
N2. Europium-154		N2. 1.4E03 pCi/g
N3. Europium-155		N3. 1.7E03 pCi/g

*aughters are assumed to be present at same concentrations in equilibrium.

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #15

6. Radioactive Material (element and mass number)		7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
O.	Gadolinium-153		3.0E03 pCi/g
P.	Germanium-68		4.0E03 pCi/g*
Q.	Gold-195		2.0E03 pCi/g
R.	Hafnium-181		1.0E03 pCi/g
S.	Hydrogen-3		2.0E07 pCi/g
T1.	Iodine-125		1.5E03 pCi/g
T2.	Iodine-129		3.1E03 pCi/g
U.	Iridium-192		2.5E03 pCi/g
V1.	Iron-55		1.8E06 pCi/g
V2.	Iron-59		4.0E02 pCi/g
W.	Lead-210		2.3E05 pCi/g*
X.	Manganese-54		5.6E03 pCi/g
Y.	Mercury-203		1.0E04 pCi/g
Z.	Neptunium-237		2.0E03 pCi/g
AA1.	Nickel-59		7.0E02 pCi/g
AA2.	Nickel-63		2.0E06 pCi/g
BB.	Niobium-94		1.6E02 pCi/g
CC1.	Plutonium-238		1.0E04 pCi/g

aughters are assumed to be present at same concentrations in equilibrium.

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RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

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Amendment #15

	6. Radioactive Material (element and mass number)	7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
CC2.	Plutonium-238		CC2. 8.2E03 pCi/g*
CC3.	Plutonium-239		CC3. 9.9E03 pCi/g
CC4.	Plutonium-240		CC4. 1.0E04 pCi/g
CC5.	Plutonium-241		CC5. 3.5E05 pCi/g
CC6.	Plutonium-241		CC6. 1.1E03 pCi/g*
CC7.	Plutonium-242		CC7. 1.0E04 pCi/g
DD.	Polonium-210		DD. 2.0E04 pCi/g
EE.	Potassium-40		EE. 1.0E04 pCi/g
FF.	Promethium-147		FF. 4.0 E03 pCi/g*
GG1.	Radium-226		GG1. 2.0E03 pCi/g*
GG2.	Radium-228		GG2. 1.8E03 pCi/g
GG3.	Radium-228 (1 year)		GG3. 1.2E03 pCi/g*
GG4.	Radium-228 (5 years)		GG4. 6.7E02 pCi/g*
GG5.	Radium-228 (10 years)		GG5. 5.6E02 pCi/g*
HH.	Rubidium-83		HH. 1.0E03 pCi/g
II.	Ruthenium-106		II. 1.9E04 pCi/g*
JJ.	Scandium-46		JJ. 4.0E02 pCi/g
KK.	Selenium-75		KK. 1.0E03 pCi/g

*aughters are assumed to be present at same concentrations in equilibrium.

UTAH DIVISION OF RADIATION CONTROL
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Amendment #15

6. Radioactive Material (element and mass number)	7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
LL. Silver-108m		LL. 5.0E02 pCi/g
MM. Silver-110m		MM. 5.6E02 pCi/g
NN. Sodium-22		NN. 7.8E02 pCi/g
OO1. Strontium-85		OO1. 5.0E02 pCi/g
OO2. Strontium-89		OO2. 2.0E03 pCi/g
OO3. Strontium-90		OO3. 2.0E04 pCi/g
PP. Sulfur-35		PP. 4.0E03 pCi/g
QQ. Technetium-99		QQ. 1.0E05 pCi/g
RR1 Thorium-230		RR1. 1.5E04 pCi/g
RR2. Thorium-232		RR2. 6.8E02 pCi/g*
SS. Tin-113		SS 7.3E05 pCi/g
TT1. Uranium-234		TT1. 3.7E04 pCi/g
TT2. Uranium-235		TT2. 7.7E02 pCi/g
TT3. Uranium-236		TT3. 3.6E04 pCi/g
TT4. Uranium-238		TT4. 2.8E04 pCi/g
TT5. Uranium-natural		TT5. 1.8E04 pCi/g
TT6. Uranium-depleted		TT6. 1.1E05 pCi/g
UU. Yttrium-91		UU. 2.0E03 pCi/g

aughters are assumed to be present at same concentrations in equilibrium.

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #19

ıvirocare of Utah, Inc.
› West Broadway, Suite 240
ılt Lake City, Utah 84101

In accordance with submittal dated August 19, 1994, radioactive material license number UT 2300249 is nended as follows:

:EMS 6, 7, AND 8.

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6. Radioactive Material (element and mass number)		7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal	
A1.	Americium-241	A1. through WW. inclusive. Volumetric bulky soil or soil-like materials or debris	A1.	2.3E03 pCi/g
›2.	Americium-243		A2.	1.7E03 pCi/g
B1.	Antimony-124		B1.	7.9E02 pCi/g
B2.	Antimony-125		B2.	5.3E03 pCi/g
C.	Barium-133		C.	4.0E03 pCi/g
D.	Beryllium-7		D.	3.8E04 pCi/g
E.	Cadmium-109		E.	4.6E04 pCi/g*
F.	Calcium-45		F.	4.0E08 pCi/g
G.	Carbon-14		G.	4.0E05 pCi/g
H1.	Cerium-139		H1.	2.0E03 pCi/g
H2.	Cerium-141		H2.	4.0E03 pCi/g
H3.	Cerium-144		H3.	4.0E03 pCi/g*
I1.	Cesium-134		I1.	1.2E03 pCi/g

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #19

6. Radioactive Material (element and mass number)	7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
I2. Cesium-135		I2. 5.0E02 pCi/g
I3. Cesium-137		I3. 5.6E02 pCi/g*
J. Chromium-51		J. 6.8E04 pCi/g
K1. Cobalt-56		K1. 3.6E02 pCi/g
K2. Cobalt-57		K2. 1.9E04 pCi/g
K3. Cobalt-58		K3. 1.6E03 pCi/g
K4. Cobalt-60		K4. 3.6E02 pCi/g
L. Copper-67		L. 2.0E03 pCi/g
M1. Curium-242		M1. 1.4E06 pCi/g
M2. Curium-243		M2. 1.5E03 pCi/g
M3. Curium-244		M3. 1.0E04 pCi/g
N1. Europium-152		N1. 1.7E03 pCi/g
N2. Europium-154		N2. 1.4E03 pCi/g
N3. Europium-155		N3. 1.7E03 pCi/g
O. Gadolinium-153		O. 3.0E03 pCi/g
P. Germanium-68		P. 4.0E03 pCi/g*
Q. Gold-195		Q. 2.0E03 pCi/g
R. Hafnium-181		R. 1.0E03 pCi/g

UTAH DIVISION OF RADIATION CONTROL
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License # UT 2300249
Amendment #19

6. Radioactive Material (element and mass number)		7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
S.	Hydrogen-3		2.0E07 pCi/g
T1.	Iodine-125		1.5E03 pCi/g
T2.	Iodine-129		3.1E03 pCi/g
U.	Iridium-192		2.5E03 pCi/g
V1.	Iron-55		1.8E06 pCi/g
V2.	Iron-59		4.0E02 pCi/g
W.	Lead-210		2.3E05 pCi/g*
X.	Manganese-54		5.6E03 pCi/g
Y.	Mercury-203		1.0E04 pCi/g
Z.	Neptunium-237		2.0E03 pCi/g++
AA1.	Nickel-59		7.0E02 pCi/g
AA2.	Nickel-63		2.0E06 pCi/g
BB.	Niobium-94		1.6E02 pCi/g
CC1.	Plutonium-238		1.0E04 pCi/g
CC2.	Plutonium-239		9.9E03 pCi/g
CC3.	Plutonium-240		1.0E04 pCi/g
CC4.	Plutonium-241		3.5E05 pCi/g
CC5.	Plutonium-242		1.0E04 pCi/g

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6. Radioactive Material (element and mass number)		7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
DD.	Polonium-210		DD. 2.0E04 pCi/g
EE.	Potassium-40		EE. 1.0E04 pCi/g
FF.	Promethium-147		FF. 4.0E03 pCi/g*
GG1.	Radium-226		GG1. 2.0E03 pCi/g*
GG2.	Radium-228		GG2. 1.8E03 pCi/g
GG3.	Radium-228 (1 year)		GG3. 1.2E03 pCi/g#
GG4.	Radium-228 (5 years)		GG4. 6.7E02 pCi/g#
GG5.	Radium-228 (10 years)		GG5. 5.6E02 pCi/g#
HH.	Rubidium-83		HH. 1.0E03 pCi/g
II.	Ruthenium-106		II. 1.9E04 pCi/g*
JJ.	Scandium-46		JJ. 4.0E02 pCi/g
KK.	Selenium-75		KK. 1.0E03 pCi/g
LL.	Silver-108m		LL. 5.0E02 pCi/g*
MM.	Silver-110m		MM. 5.6E02 pCi/g*
NN.	Sodium-22		NN. 7.8E02 pCi/g
OO1.	Strontium-85		OO1. 5.0E02 pCi/g
OO2.	Strontium-89		OO2. 2.0E03 pCi/g

UTAH DIVISION OF RADIATION CONTROL
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6. Radioactive Material (element and mass number)		7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
OO3.	Strontium-90		OO3. 2.0E04 pCi/g*
PP.	Sulfur-35		PP. 4.0E03 pCi/g
QQ.	Technetium-99		QQ. 1.0E05 pCi/g
RR1	Thorium-230		RR1. 1.5E04 pCi/g
RR2.	Thorium-232		RR2. 6.8E02 pCi/g*
SS.	Tin-113		SS 7.3E05 pCi/g
TT1.	Uranium-234		TT1. 3.7E04 pCi/g
T2.	Uranium-235		TT2. 7.7E02 pCi/g*
TT3.	Uranium-236		TT3. 3.6E04 pCi/g
TT4.	Uranium-238		TT4. 2.8E04 pCi/g+
TT5.	Uraniuum-natural		TT5. 1.8E04 pCi/g+
TT6.	Uranium-depleted		TT6. 1.1E05 pCi/g+
UU.	Yttrium-91		UU. 2.0E03 pCi/g
VV.	Zinc-65		VV. 1.1E04 pCi/g
WW.	Zirconium-95		WW. 5.0E02 pCi/g*

Ra-228 with its decay products present at the times indicated after separation as pure Ra-228.

Decay products are assumed to be present in concentrations equal to the parent.

+ Short lived decay products of U-238 (Th-234 and Pa-234) and of Np-237 (Pa-233) are assumed to be present in concentrations equal to the parent.

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UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #14

). AUTHORIZED USE This condition has been superseded by license amendment #16 "See attached".

~~Radioactive material as~~ bulk radioactive waste may be received, stored and disposed of by land burial. The licensee shall not accept low-~~level~~ radioactive waste generated outside the region comprised of the party states to the Northwest Interstate Compact on ~~Low-Level~~ Radioactive Waste Management ("Compact") namely Alaska, Hawaii, Idaho, Montana, Oregon, Utah and Washington, ~~unless~~ the provisions of Articles IV and V of the Compact are met. Prior to receiving any such shipments, the licensee ~~shall submit~~ to the Utah Division of Radiation Control documentation evidencing compliance with these Compact provisions.

CONDITIONS

.0. Licensed material shall be used at the licensee's facility located in Section 32 of Township 1 South and Range 11 West, Tooele County, Utah.

11. The licensee shall not possess at any time, more than 300,000 cubic yards of radioactive waste material which is not disposed of in accordance with the finished design requirements. This includes all wastes in storage or active processing.

.2. Pursuant to R313-12-54(1), the licensee is granted an exemption to R313-25-9, as it relates to land ownership and assumption of ownership.

.3. The maximum quantity of special nuclear material which the licensee may possess, undisposed of, at any one time shall not exceed; 350 grams of U-235, 200 grams of U-233, and 200 grams Pu, or any combination of them in accordance with the following formula.

$$\frac{\text{(Grams U-235)}}{350} + \frac{\text{(Grams U-233)}}{200} + \frac{\text{(Grams Pu)}}{200} \leq 1$$

.4. Licensed material specified in Item 6.A through 6.KKK shall not be placed in a disposal cell unless it has been determined that the concentration of radionuclides is approximately homogeneous within the physical form of the waste. This does not pertain to debris superficially contaminated with licensed materials.

5. A. The licensee may receive for treatment, storage, and disposal any radioactive waste as authorized by this license that is also determined to be hazardous as permitted by the "Hazardous Waste Plan Approvals" issued and modified by the Executive Secretary, Utah Solid and Hazardous Waste Control Board and "HWSA Permit" issued by the U.S. Environmental Protection Agency.

B. The licensee shall dispose of these wastes in the "mixed waste" disposal embankment only.

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16. A. If a mixture of radionuclides a, b, and c are present in the waste in the concentrations C_a, C_b, and C_c and if the applicable maximum average waste concentrations from Item 8 of this license are MWC_a, MWC_b, and MWC_c respectively, then the concentration in the waste shall be limited so that the following relationship exists.

$$\frac{C_a}{MWC_a} + \frac{C_b}{MWC_b} + \frac{C_c}{MWC_c} \leq 1$$

B. If a single radionuclide is present in the waste, the maximum average concentration shall not exceed the applicable value found in Item 8 of this license.

17. Sealed sources as defined in R313-12-3(64) shall not be accepted for disposal.

18. Radioactive waste containing free liquid shall not be accepted for disposal. Such waste shall be managed in accordance with the LARW Waste Management Plan currently approved by the Executive Secretary of the Utah Radiation Control Board.

The licensee shall comply with the provisions of Chapter R313-18, "Notices, Instructions and Reports to Workers by Licensees or Registrants, Inspections" and Chapter R313-15, "Standards for Protection Against Radiation".

20. The licensee may transport licensed material or deliver licensed material to a carrier for transport in accordance with the provisions of R313-19-100 "Transportation".

21. Written procedures shall be maintained and available at the disposal facility for operations involving radioactive materials. The procedures shall incorporate operating instructions and appropriate safety precautions for the work. The employee training program shall include detailed review of the operating procedures applicable to the employee's assignments. The requirement for written procedures shall include establishment of procedures for conduct of the radiation safety and environmental monitoring programs, including analytical procedures and instrument calibration requirements. Written procedures and subsequent changes to the procedure shall be reviewed and approved by the Corporate Radiation Safety Officer and the Project Manager. At least annually, all procedures shall be reviewed to assure continued applicability.

22. The Corporation Radiation Safety Officer or other qualified individual designated by the Corporate Radiation Safety Officer shall perform and document weekly inspections of the facility and report any findings of non-compliance, affecting radiological safety, to the Project Manager. Items for inspection include: operating procedures, license requirements and safety practices.

UTAH DIVISION OF RADIATION CONTROL
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23. The licensee shall conduct contamination surveys in accordance with the following table.

ROUTINE MONITORING AND CONTAMINATION SURVEYS

Type	Location	Frequency
A. Gamma Radiation Levels	1. Perimeter of Controlled Area(s)	1. Weekly
	2. Office Area	2. Weekly
	3. Lunch/Change Area	3. Weekly
	4. Transport Vehicles	4. Upon Arrival at Site and before departure.
B. Contamination Wipes	1. Eating Area	1. Weekly
	2. Change Area	2. Weekly
	3. Office Areas	3. Weekly
	4. Railcar rollover and control shack	4. Weekly
	5. Equipment/Vehicles	5. Once before release
C. Employee/ Personnel	1. Skin & Personal clothing	1. Prior to exiting controlled area
D. Gamma Exposure	1. Administration Bldg.	1. Quarterly
	2. Security Trailer	2. Quarterly
E. Radon Concentration	1. Administration Bldg.	1. Quarterly
	2. Security Trailer	2. Quarterly

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24. The licensee shall conduct a bioassay program in accordance with letter dated July 16, 1993.

25. The use of respirators shall be controlled by a respiratory protection program in accordance with letter dated July 16, 1993, and as stipulated in R313-15-103.

26. The licensee shall calibrate air sampling equipment at intervals not to exceed six months.

27. ~~The operational environmental monitoring program shall be conducted in accordance with revised Section 4.5.4, table 4.7, and figure 4.5 submitted in letter dated July 20, 1993.~~ This Condition has been Superseded By Amendment #18, See Attached

28. A. Vehicles, containers, facilities, materials, equipment or other items for unrestricted use, except conveyances as defined in R313-19-4, used for commercial transport of radioactive waste material, shall not be released from the licensee's control if contamination exceeds the limits found in Table 28-A:

TABLE 28 - A

Nuclide[a]	Column I Average [b,c,j]	Column II Maximum [b,c,j]	Column III Removable [b,c,j]
U-nat, U-235, U-238, and associated decay products	5,000 dpm alpha/ 100 cm^2	15,000 dpm alpha/ 100 cm^2	1,000 dpm alpha/ 100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emissions or spontaneous fission) except Sr-90 and other noted above.	5,000 dpm beta, gamma/100 cm^2	15,000 dpm beta-gamma/100 cm^2	1,000 dpm beta-gamma/100 cm^2

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28. (con't)

a. Where surface contamination by both alpha- and beta-gamma emitting nuclides exists, the limits established for alpha- and beta-gamma emitting nuclides should apply independently.
b. As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
c. Measurements of average contaminant should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each such object.
d. The maximum contamination level applies to an area of not more than 100 cm^2.
e. The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping the area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of know efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.
f. The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters shall not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

28. B. All conveyances as defined in R313-19-14 used for commercial transport of radioactive material to Envirocare will be decontaminated to the release limits set forth in the following:

TABLE 28 - B
REMOVABLE EXTERNAL RADIOACTIVE CONTAMINATION - WIPE LIMITS

Contaminant	Maximum permissible limits	Maximum permissible limits
	micro Ci/cm^2	dpm/cm^2
Beta-gamma emitting radionuclides; all radionuclides with half-lives less than ten days; natural uranium; natural thorium; uranium-235; uranium 238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical concentrates.....	10^{-5}	22
All other alpha emitting radionuclides.....	10^{-6}	2.2

Each transport vehicle used for transporting radioactive materials as an exclusive use shipment... shall be surveyed with appropriate radiation detection instruments after each use. A vehicle shall not be returned to service until the average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters shall not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber, and there is no significant removable (non-fixed) radioactive surface contamination as specified in the above Table 28-B.

UTAH DIVISION OF RADIATION CONTROL
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9. A quarterly report shall be prepared by the Corporate Radiation Safety Officer for the Project Manager and Company President evaluating employee exposures, effluent releases and environmental data to determine:

   A. If there are any upward trends in personnel exposures for identifiable categories of workers or types of operations or in effluent releases;

   B. If exposures and effluent might be lowered under the concept of maintaining exposures and effluent as low as reasonably achievable; and

   C. If equipment for exposure and effluent control is being properly used and maintained.

0. In accordance with R313-25-33, the licensee shall submit annual reports to the Division of Radiation Control by the end of the first calendar quarter of each year for the preceding year. The reports shall include:

   A. Specification of the quantity of each of the principal contaminants released to unrestricted areas in liquid and in airborne effluent during the preceding year.

   B. The results of the environmental monitoring program;

   C. A summary of licensee disposal unit survey and maintenance activities; and

   D. A summary of the volume, radioisotopes and their activities for materials disposed of.

1. Except as provided by this condition, the licensee shall maintain the results of sampling, analyses, surveys, and instrument calibration, reports on inspections and audits, employee training records as well as any related reviews, investigations and corrective actions, for five (5) years. The licensee shall maintain personnel exposure records in accordance with R313-15-401.

2. Operations shall be conducted by or under the supervision of Vernon E. Andrews, Corporate Radiation Safety Officer, or other individuals designated by the Corporate Radiation Safety Officer upon successful completion of the licensee's training program.

3. The licensee shall staff the operations of the facility in accordance with the revised organization chart submitted in letter dated July 16, 1993. In addition the licensee shall provide an updated organization chart within 10 days from any change.

4. The licensee staff shall meet the qualifications as described in Section 8.2 and shall have the responsibilities as described in Section 8.1.2 of the license amendment application dated September 20, 1990.

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35. The licensee shall not initiate disposal operations in newly excavated areas until the Division of Radiation Control has inspected and approved the cell/embankment liner.

36. The licensee shall provide "as built drawings" of the facility, at intervals not to exceed six (6) months. Drawings shall be submitted by February 1 and August 1 of each year. The drawings shall show conditions on the site as they existed no earlier than thirty (30) days prior to the submittal of the drawings to the Division of Radiation Control. The drawings shall be certified by a Utah Licensed Land Surveyor or Professional Engineer. Drawings submitted as, "as built drawings" will be marked as such, and will be marked in the same place on each drawing. Record drawings showing approved future designs, final or finished conditions at the site may be included in the "as built drawings", but shall be marked as "record drawings".

37. Reserved.

38. For the purpose of this license, debris is defined as any radioactive waste for disposal other than soils. Compactible debris is defined as: (A) having a gradation that will pass through a four inch (4") grizzly and; (B) as having a density greater than seventy pounds per cubic foot dry weight in accordance with ASTM D-698. Contaminated materials, other than soil, not meeting either of these criteria are defined as noncompactible debris.

The licensee shall place bulk radioactive materials in lifts with an uncompacted thickness not exceeding twelve inches (12").

40. In-place bulk radioactive waste shall be compacted at a moisture content up to three percent (3%) above optimum as determined by the Standard Proctor Method ASTM D-698.

41. The licensee shall compact each lift to not less than ninety percent (90%) of optimum density as determined by Standard Proctor Method ASTM D-698. Sampling points for compaction testing shall include locations immediately adjacent to debris when debris is included in the lift.

42. All debris shall be less than ten inches (10") in at least one (1) dimension, and no longer than eight feet (8') in any dimension.

43. The final twenty-four inches (24") of the radioactive waste material embankment, within the side slopes and the top surface, shall be free of debris. In addition, no debris (compactable or non-compactable) shall be placed within twenty-four inches (24") of the clay liner.

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #14

14. A lift or any portion of a lift shall be limited to less than ten percent (10%) by volume of debris and the debris shall be uniformly distributed throughout the lift. However, noncompactible debris in the form of concrete, stone or metal may be placed in the lift up to twenty-five percent (25%) by volume, of the total lift, uniformly distributed throughout, and the debris is placed to minimize void space in the lift.

15. The licensee shall excavate the disposal cell liner, consisting of native materials, to a depth of twenty-four inches (24") and replace it with clay in uncompacted lifts not to exceed nine inches (9"). Each lift shall be compacted to not less than ninety-five percent (95%) optimum density as determined by ASTM D-698 and field permeability as specified in the currently approved Engineering Drawings.

16. The licensee shall fulfill and maintain compliance with all conditions and shall meet all requirements in the currently approved Construction QA/QC Plan and currently approved Engineering Drawings.

17. The disposal cell liner and radon barrier shall be constructed with a moisture content of zero percent (0%) to plus five percent (+5%) of optimum moisture as determined by Standard Proctor Method ASTM D-698.

18. The licensee shall compact the radon barrier to not less than 95 percent of optimum density as determined by Standard Proctor Method ASTM D-698 and a field permeability as specified in the currently approved Engineering Drawings.

19. The licensee shall record, at the time of acceptance, the date and time of day that any lift or portion of a lift has been accepted by the licensee as finished in accordance with all specifications and license conditions.

20. The licensee shall fulfill and maintain compliance with all conditions and requirements in the Waste Characterization Plan currently approved by the Division of Radiation Control.

21. The licensee shall fulfill and maintain compliance with all conditions and requirements in the LARW Waste Management Plan currently approved by the Division of Radiation Control.

22. ~~The licensee shall utilize a manifest ("Radioactive Waste Shipment and Disposal Record," Envirocare Form E-100) containing the information required in R313-15-311(2) and (3) including:~~

A. Specification of any solidification agents utilized;

B. Waste containing more than 0.1% chelating agents by weight ~~must be~~ identified and the weight percentage of the chelating agent estimated. Chelating agents means amine polycarboxylic acids, hydroxyl-carboxylic acids, gluconic acids and polycarboxylic acids;

See This Condition has been superseded by Amendment #19, See Attached

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #14

3. The licensee shall not accept radioactive waste for storage and disposal unless the licensee has received a complete "Radioactive Waste Shipment and Disposal Record" (Form #E-100) from the shipper.

4. The licensee shall maintain copies of complete manifests or equivalent documentation until the Division of Radiation Control authorizes their disposition.

5. The licensee shall immediately notify the Division of Radiation Control or the Division's on-site representative of any waste shipment where a possible violation of applicable regulations or license conditions has been found.

6. ~~The licensee shall require anyone who transfers radioactive waste to the facility comply with the requirements in R313-15-311(4)(a) through (h).~~ This condition has been superseded by Amendment #19, See Attached.

7. The licensee shall acknowledge receipt of the waste within one (1) week of receipt by returning a signed copy of the manifest or equivalent documentation to the shipper. The shipper to be notified is the licensee who last possessed the waste and transferred the waste to the licensee. The returned copy of the manifest or equivalent documentation shall indicate any discrepancies between materials listed on the manifest and materials received.

   The licensee shall notify the shipper (i.e., the generator, the collector, or processor) and the Division of Radiation Control when any shipment or part of a shipment has not arrived within 60 days after the advance manifest was received.

9. The licensee shall maintain a record for each shipment of waste disposed of at the site. As a minimum, the record shall include:

   A. The date of disposal of the waste;

   B. The location of waste in the disposal site;

   C. The condition of the waste packages received;

   D. Any discrepancy between the waste listed on the shipment manifest or shipping papers and the waste received in the shipment.

   E. A description of any evidence of leaking or damaged packages or radiation or contamination in excess of applicable regulatory limits; and

   F. A description of any repackaging of wastes in any shipment.

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #14

50. In accordance with R313-25-31 the licensee shall maintain a Utah Division of Radiation Control Surety (Trust) Agreement adequate to fund the decommissioning and reclamation of the grounds, equipment and facilities. The surety shall be reviewed and updated annually and a report submitted to the Utah Division of Radiation Control within 60 days after June 1st of each year. The surety arrangement shall be updated as necessary to reflect decommissioning and reclamation costs.

51. Truck, railcar, and other equipment washdown (decontamination) facilities, including evaporation ponds, shall be controlled with fences or other approved barriers to prevent intrusion.

52. All burial embankments and waste storage areas, including immediately adjacent drainage structures, shall be controlled areas, surrounded by a six foot (6') high, chain link fence. All permanent fence shall be chain link, six feet (6') high, topped with three strand barbed wire, top tension wire and twisted selvedge.

53. The licensee shall fulfill and maintain compliance with all conditions and shall meet all compliance schedules stipulated in the Ground Water Discharge Permit, number UGW 450005, issued by the Executive Secretary of the Utah Water Quality Board.

54. One (1) year prior to the anticipated closure of the site, the licensee shall submit for approval a site decontamination and decommissioning plan. As part of this plan, the licensee shall demonstrate by measurements and/or modeling that concentrations of radioactive materials which may be released to the general environment, after site closure, will not result in an annual dose exceeding 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public.

55. ~~Except as specifically provided~~ otherwise by this license, the licensee shall possess and use radioactive material described in Item 6, 7, and 8 ~~of this license and conduct site operations in accordance with statements~~, representations, ~~operating procedures~~, and disposal criteria, ~~heretofore made by the licensee~~ or his authorized representative in application for and subsequent to issuance of Utah Radioactive Material License No. UT 2300249 and amendments thereto.

Date 9/10/93

William J. Sinclair, Executive Secretary, Utah Radiation Control Board

~~→ #55 - See following document dated 3/24/94~~
→ This Condition has been superseded by license Amendment #16 "see attached".

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #15

6. Radioactive Material (element and mass number)	7. Chemical and/or physical form	8. Maximum average concentration in waste for disposal
VV. Zinc-65		VV. 1.1E04 pCi/g
WW. Zirconium-95		WW. 5.0E02 pCi/g*

Daughters are assumed to be present at same concentrations in equilibrium.

****

ONDITION 65.

5. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Item 6, 7, and 8 of this license and conduct site operations in accordance with statements, representations, operating procedures, and disposal criteria, heretofore made by the licensee or his authorized representative in application for and subsequent to issuance of Utah Radioactive Material License No. UT 2300249 and amendments thereto. This condition has been superseded by Amendment # 16. "See Attached."

AH RADIATION CONTROL BOARD

William J. Sinclair

illiam J. Sinclair, Executive Secretary

3/24/94
Date

October 1989

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE

License # UT 2300249
Amendment # 16

:nvirocare of Utah, Inc.
6 West Broadway, Suite 240
:alt Lake City, Utah 84101

n accordance with Utah Radiation Control Rule, R313-19-61(1), radioactive material license number UT2300249 ; amended as follows:

TEM 9.

****

. Authorized Use.

Radioactive material as bulk radioactive waste may be received, stored and disposed of by land burial. Additionaly, prior to receiving an initial, low-level radioactive waste shipment for disposal, the licensee shall obtain from the generator, documentation which demonstrates that the low-level radioactive wastes have been approved for export/transfer to the licensee. Approval is required from the low-level radioactive waste compact of origin, or for states unaffiliated with a low-level radioactive waste compact, the state of origin, to the extent a state can exercise such approval. The documentation shall be submitted to the Executive Secretary of the Utah Radiation Control Board within 10 working days of the last day of each month.

****

:ONDITION 65.

5. ~~Except as specifically provided otherwise~~ by this license, the licensee shall possess and use radioactive material described in Item 6,7, and 8 of this license ~~and conduct~~ site operations in accordance with statements, representations, operating procedures, and disposal criteria, heretofore made by the licensee or his authorized representative in application for and subsequent to issuance of Utah Radioactive material license No. UT 2300249 and amendments thereto. This condition has been superseded by amendment #17 See Attached

ITAH RADIATION CONTROL BOARD

August 10, 1994
)ate

D Finerock for
William J. Sinclair, Executive Secretary

October 1989

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE

License # UT 2300249
Amendment # 17

Envirocare of Utah, Inc.
46 West Broadway, Suite 240
Salt Lake City, Utah 84101

In accordance with amendment application letter, dated June 21, 1994, radioactive material license number UT2300249 is amended as follows:

CONDITION 37.

****

37. A. Notwithstanding the requirements of license conditions 38, 39, 41, 42, and 44, the licensee may accept for disposal, oversized debris in the form of the following filled containers:

1. B-25 boxes (96 cubic feet capacity)
2. B-12 boxes (48 cubic feet capacity)
3. Standard drums of at least 50 gallons
4. Over-pack drums
5. Other monolithic forms similar in size and shape to those listed in 37.A.1. through 37.A.4.

The contents of these containers shall have been initially formed as a single substantial monolithic unit and the bulk density of the contents in the containers shall be at least 70 pounds per cubic foot. Such oversized debris shall be managed and disposed of in accordance with the currently approved "Oversized Debris Placement Plan" and the currently approved "Construction Quality Assurance/ Quality Control Plan."

B. For other non-conforming oversized debris, the licensee shall request authorization for disposal on a case by case basis.

****

CONDITION 65.

65. ~~Except as specifically~~ provided otherwise by this license, the licensee shall possess and use radioactive material described in ~~Items 6,7, and 8 of this license~~ and conduct site operations in accordance with statements, representations, operating procedures, and disposal ~~criteria, heretofore~~ made by the licensee or his authorized representative in application for and subsequent to issuance of Utah Radioactive ~~material~~ license No. UT 2300249 and amendments thereto. This Condition has been superseded by Amendment #18, See Attached

UTAH RADIATION CONTROL BOARD

August 26, 1994
Date

William J. Sinclair, Executive Secretary

DRC-03
October 1989

EPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIALS LICENSE

License # UT 2300249
Amendment # 18

Envirocare of Utah, Inc.
46 West Broadway, Suite 240
Salt Lake City, Utah 84101

In accordance with amendment request letters, dated August 31, 1993 and September 8, 1994, radioactive material license number UT2300249 is amended as follows:

CONDITION 27.

****

27a. The operational environmental monitoring program shall be conducted in accordance with the license application revised Section 4.5.4, table 4.7, and figure 4.5, submitted in letter dated July 20, 1993.

27b. Notwithstanding condition 27a, the licensee is exempt from Section 4.5.4.6, Wildlife Sampling.

****

CONDITION 65.

65. ~~Except as specifically~~ provided otherwise by this license, the licensee shall possess and use radioactive material ~~described~~ in Item 6, 7, and 8 of this license and conduct site operations in accordance with statements, representations, operating procedures, and disposal criteria, heretofore made by the licensee ~~or his authorized~~ representative in application for and subsequent to issuance of Utah Radioactive Material ~~License No.~~ UT 2300249 and amendments thereto. This Condition has been superseded by Amendment # 19 See Attached

UTAH RADIATION CONTROL BOARD

Sept. 30, 1994
Date

D. Finerfrock for
William J. Sinclair, Executive Secretary

UTAH DIVISION OF RADIATION CONTROL
RADIOACTIVE MATERIAL LICENSE
SUPPLEMENTARY SHEET

License # UT 2300249
Amendment #19

adioactive Material License, UT 2300249 is administratively amended as follows:

:ONDITION 52.

2. The licensee shall utilize a manifest ("Radioactive Waste Shipment and Disposal Record," Envirocare Form E-100) containing the information required in R313-15-1006.

:ONDITION 56.

6. The licensee shall require anyone who transfers radioactive waste to the facility comply with the requirements in R313-15-1006.

:ONDITION 65.

5. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Item 6, 7, and 8 of this license and conduct site operations in accordance with statements, representations, operating procedures, and disposal criteria, heretofore made by the licensee or his authorized representative in application for and subsequent to issuance of Utah Radioactive Material License No. UT 2300249 and amendments thereto.

JTAH RADIATION CONTROL BOARD

William J. Sinclair, Executive Secretary

11/9/94
Date

Appendix C3

Control No. 930521-511
Page 1 of 1 Page(s)

License Number 1354-1
AMENDMENT NO. 31
(4C) (11/30/95)

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE
SUPPLEMENTARY SHEET

QUADREX ENVIRONMENTAL COMPANY
1940 N.W. 67th Place
Gainesville, FL 32606

With reference to correspondence dated May 10, 1993, State of Florida Radioactive Materials License Number 1354-1 is hereby amended as follows:

TO CHANGE CONDITION 12 TO READ:

CONDITIONS

12. A. Licensed materials shall be used by, or under the supervision of and in the physical presence of, at the facility listed in Item 2, above, Bernhardt Warren, Jack Haacke, Raymond Whittle, David Gardner, or in Pelto, Thomas Owens, Thomas Wickes or Thomas Hannah.

B. The radiation safety officer is Bernhardt C. Warren.

Date JUN 04 1993

For the Office of Radiation Control

Michael N. Stephens
Public Health Physicist
1317 Winewood Blvd.
Tallahassee, FL 32399-0700
(904) 487-2437

Licensee copy

Control No. 920619-632
Page 1 of 9 Pages
AMENDMENT NO. 30

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE

Pursuant to Chapter 404, Florida Statutes, and Chapter 10D-91, Florida Administrative Code, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to receive, acquire, possess and transfer the radioactive materials(s) designated below and to use such radioactive material(s) for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the State of Florida, Department of Health and Rehabilitative Services now or hereafter in effect and to any conditions specified below.

Licensee	With reference to correspondence dated 11/16/92, State of Florida Radioactive Materials License Number 1354-1 is hereby amended in its entirety to read as follows:
1. Name: QUADREX ENVIRONMENTAL COMPANY	
2. Address: 1940 N.W. 67th Place Gainesville, FL 32606	4. Expiration Date: November 30, 1995 5. Category: 4C

6. Radioactive material (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
A. Any radioactive material with an atomic number 1 through 83	A. Any sealed source that has been approved for distribution by the U.S. Nuclear Regulatory Commission or an Agreement State.	A. 250 microcuries total; no single source to exceed 10 microcuries each.
B. Any radioactive material with an atomic number 84 through 95.	B. Any sealed source that has been approved for distribution by the U.S. Nuclear Regulatory Commission or an Agreement State.	B. 250 microcuries total; no single source to exceed 10 microcuries each.
C. Carbon 14	C. Liquid scintillation materials.	C. See Condition 15, below.
D. Hydrogen 3	D. Liquid scintillation materials.	D. See Condition 15 Below.

(See Page 2)

Licensee copy

Control No. 920619-632
Page 2 of 9 Pages

License Number 1354-1
AMENDMENT NO. 30
(4C) (K95)

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE

6. Radioactive material (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
E. Iodine 125 Chromium 51 Iron 59 Sulfur 35 Phosphorus 32 Calcium 45 Sodium 22 Cobalt 57 Zinc 65 Rubidium 86 Gallium 67 Indium 111 Chlorine 36 Mercury 203 Iodine 131 Selenium 75 Germanium 68 Cadium 109 Cerium 141 Scandium 46 Copper 64 Gold 195 Technetium 99 Gadolinium 153 Tin 119 Tin 113 Phosphorus 33	E. Liquid scintillation materials.	E. See Condition 15 Below.
F. Radon 222 and it's daughter products.	F. Liquid scintillation material contained in radon detection kits only.	F. See Condition 15 Below.

9. Authorized Use.

A. and B. To be use for calibration or reference standards.

(See Page 3)

Control No. 920619-632
Page 3 of 9 Pages

License Number 1354-1
AMENDMENT NO. 30
(4C) (K95)

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE

9. Authorized Use. (Continued)

C. through F. Liquid scintillation materials shall be received, processed and disposed of in accordance with Condition 15 of this license.

CONDITIONS

10. A. The authorized place of receipt, storage, use and processing shall be the licensee's facility located at 1940 N.W. 67th Place, Gainesville, Florida 32606.

B. Liquid scintillation fluids may be transported to Oldover Corporation's rotary kiln located at Green Cove Springs, Florida, where they are mixed with the kiln's fuel for burning.

C. Carbon 14 and Hydrogen 3 liquid scintillation fluids described in Items 6, 7, 8, and 9, Subitems C and D may be transported and disposed of in accordance with section 10D-91.421, Florida Administrative Code. This does not prohibit the transport or disposal of these materials in any agreement state or NRC region which have equivalent regulations such as 10 CFR 20.306. This does not relieve the licensee from complying with other applicable federal, state and local regulations governing any other toxic or hazardous properties of these materials.

11. Failure to comply with the provisions of this license is a felony of the third degree pursuant to section 404.161, Florida Statutes. Also, violations may warrant an administrative fine of up to $1,000.00 per violation per day, pursuant to section 404.162, Florida Statutes.

12. A. Licensed materials shall be used by, or under the supervision of and in the physical presence of, at the facility listed in Item 2, above, Bernhardt Warren, Jack Flaacke, Raymond Whittle, David Gardner, Orin Pelto or Thomas Owens.

B. The radiation safety officer is Bernhardt C. Warren.

(See Page 4)

License Number 1354-1
AMENDMENT NO. 30
(4C) (K95)

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE

13. The licensee shall comply with the provisions of Chapter 10D-91, Florida Administrative Code, Part X, "Notices, Instructions and Reports to Workers; Inspections" and Part IV, "Standards for Protection Against Radiation."

14. Sealed sources containing radioactive materials described in Items 6, 7, 8 and 9, Subitems A and B shall not be opened.

15. A. Receipt, possession, storage, processing and disposal of licensed materials described in Items 6, 7, 8, and 9, Subitems C and D must satisfy the following:

1. Be received and processed in concentrations no greater than 0.05 microcuries per gram of medium;

2. Be transported for disposal in concentrations no greater than 0.05 microcuries per gram of medium;

3. The total activity processed and transported to Oldover Corporation's rotary kiln located in Green Cove Springs, Florida and other facilities located in the state of Florida shall not exceed 19.9 curies in a calendar year; and

4. Be received, processed, stored and disposed of in accordance with the correspondence described in Condition 22.

B. Receipt, possession, storage, processing and disposal of licensed materials described in Items 6, 7, 8, and 9, Subitems E and F must satisfy the following:

1. Be received and processed in concentrations no greater than 0.05 microcuries per gram of medium;

2. Be transported for disposal to Oldover Corporation's rotary kiln located at Green Cove Springs, Florida, in concentrations no greater than 0.05 microcuries per gram of medium;

3. The total activity processed and transported to Oldover Corporation's rotary kiln located in Green Cove Springs, Florida shall not exceed 100 millicuries in a calendar year; and

(See Page 5)

License Number 1354-1
AMENDMENT NO. 30
(4C) (K95)

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE

15. B. 4. Be received, processed, stored and disposed of in accordance with the correspondence described in Condition 22.

16. Licensed material described in Items 6, 7, 8 and 9, Subitem C through F, shall not be stored at the licensee's facility located at the address in Item 2, above, for a period greater than 180 days from the date of receipt. The licensee must maintain records of receipt and disposal, including dates, activities and isotopes for inspection by the Department of Health and Rehabilitative Services.

17. Licensed material shall be received, stored and processed in such a manner as to preclude use or access by unauthorized personnel.

18. The licensee shall notify the Department of Health and Rehabilitative Services within 48 hours of customers who submit radioactive materials not in conformance with Condition 15. This 48 hour notifications may be made by telephone. The notification shall include the generator's, name, address, license number, isotopes, concentrations or activities, and date and description of materials submitted. This notification shall be made in writing to the Department of Health and Rehabilitative Services within 30 days of the date the materials are submitted to the licensee.

19. The licensee shall notify the Office of Radiation Control at least 48 hours in advance of shipping its low-level radioactive waste to a commercial treatment, storage or disposal facility. Notifications may be made by telephone or in writing to the Office of Radiation Control, Department of Health and Rehabilitative Services, Post Office Box 680069, Orlando, Florida 32868-0069.

20. Individuals involved in operations which utilize, at any one time or over a 3 month period, radioiodine in an unsealed form that exceeds the activities specified in Table 1 of the NRC's Regulatory Guide 8.20 shall have bioassays performed at the following frequency and follow the corresponding actions:

A. (I) A bioassay shall be taken within 72 hours of initial use of radioiodine and every 2 weeks thereafter. When radioiodine use is on an infrequent basis (less than every 2 weeks), a bioassay shall be taken within 10 days of the last day of use.

(See Page 6)

License Number 1354-1
AMENDMENT NO. 30
(4C) (K95)

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE

20. A. (II) The licensee shall take the corresponding actions according to the action levels listed below:

(a) If the thyroid burden at the time of measurement exceeds 0.12 microcurie of iodine 125 or 0.04 microcurie of iodine 131, the following actions shall be taken:

(1) An investigation of the operations involved, including air and other facility surveys, shall be carried out to determine the cause(s) of exposure and to evaluate the potential for further exposures.

(2) If the investigation indicates that further work in the area might result in exposure of a worker to concentrations that would cause the limiting intakes established in section 10D-91.404, F.A.C., to be exceeded, the licensee shall restrict the worker from further exposure until the source of exposure is discovered and corrected.

(3) Corrective actions that will eliminate or lower the potential for further exposures shall be implemented.

(4) A repeat bioassay shall be taken within 2 weeks of the previous measurement and shall be evaluated within 24 hours after the measurement in order to confirm the presence of internal radioiodine and to obtain an estimate of its effective half-life for use in estimating dose commitment.

(5) Notification reports must be provided as required by sections 10D-91.426, and 10D-91.428, F.A.C., or as required by conditions of the license pursuant to section 10D-91.408, F.A.C.

(b) If the thyroid burden at any time exceeds 0.5 microcurie of iodine 125 or 0.14 microcurie of iodine 131, the following actions shall be taken:

(See Page 7)

Control No. 920619-632
Page 7 of 9 Pages

License Number 1354-1
AMENDMENT NO. 30
(4C) (K95)

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE

20. A. (II) (b) (1) Carry out all steps described in A.(II)(a) of this condition.

(2) As soon as possible, refer the case to appropriate medical consultation for recommendations regarding therapeutic procedures that may be carried out to accelerate removal of radioactive iodine from the body.

(3) Carry out repeated measurements at approximately one week intervals at least until the thyroid burden is less than 0.12 microcurie of iodine 125 or 0.04 microcurie of iodine 131.

B. (I) Bioassays may be performed quarterly, if the following conditions are satisfied:

(a) The average thyroid burden for each individual working in a given area for which bioassays were performed pursuant to item A.(I), above, was less than 0.12 microcurie of iodine 125, less than 0.04 microcurie of iodine 131 and less than the corresponding proportionate amount of a mixture of these nuclides during the initial 3 month period.

(b) If measurements of the concentration of radioiodine in air are required as a condition of the license and the quarterly average concentration does not exceed 25 percent of the value for iodine 125, iodine 131 or a proportionate amount of a mixture of these nuclides as specified in Table I, Column I of section 10D-91.429, F.A.C.

(c) The working conditions during the 3 month period with respect to the potential for exposure are representative of working conditions during the period in which the quarterly bioassay frequency is employed, and there is no reasonable expectation that the criteria given in B.(I)(a) and B.(I)(b) will be exceeded.

(See Page 8)

License Number 1354-1
AMENDMENT NO. 30
(4C) (K95)

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE

20. B. (I) (d) Bioassays shall be randomly distributed over the quarter and will be done within 1 week after a procedure involving the handling of iodine 125 or iodine 131 to provide a representative assessment of exposure conditions.

(II) If the thyroid burden exceeds 0.12 microcurie of iodine 125 or 0.04 microcurie of iodine 131, the following actions shall be taken:

(a) Carry out all steps as described in A.(II)(a) and A.(II)(b) of this condition.

(b) Reinstitute bioassays every 2 weeks for at least the next 3 months before reestablishing quarterly bioassays.

21. The licensee shall not transfer possession and/or control of radioactive material, or products containing radioactive material as a contaminant except:

A. By transfer to a specifically licensed recipient; or

B. As provided otherwise by specific provision of his license pursuant to the requirements of the "Florida Control of Radiation Hazard Regulations," Chapter 10D-91, Florida Administrative Code.

22. A. Except as specifically provided otherwise by this license, the licensee shall possess and use licensed material described in items 6, 7, 8, and 9 of this license in accordance with statements, representations and procedures contained in the licensee's application dated August 27, 1987, signed by Susan E. McDonough, Radiation Safety Officer, and correspondence dated:

December 11, 1989, signed by Bernhardt C. Warren, Radiation Safety Officer;
January 16, 1990;
April 6, 1990;
April 13, 1990;
November 15, 1990, all signed by Bernhardt C. Warren, Vice President, Waste Management & Regulatory Services;

(See Page 9)

Control No. 920619-632
Page 9 of 9 Pages

License Number 1354-1
AMENDMENT NO. 30
(4C) (K95)

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
OFFICE OF RADIATION CONTROL

RADIOACTIVE MATERIALS LICENSE

22. A. (Continued)

November 15, 1991, signed by Bernhardt C. Warren, Radiation Safety Officer;
June 17, 1992, signed by Bernhardt C. Warren, Vice President; and
December 3, 1992, signed by Robert Foster, President Quadrex Environmental Company.

B. The licensee shall comply with all applicable requirements of Chapter 10D-91, Florida Administrative Code, and these regulations shall supersede the licensee's statements in applications or correspondence, unless the statements are more restrictive than the regulations.

Date DEC 2 9 1992

For the Office of Radiation Control

Michael N. Stephens
Public Health Physicist
1317 Winewood Blvd.
Tallahassee, FL 32399-0700
(904) 487-2437

Appendix C4

TRC FORM 41-3
(10-78)

TEXAS DEPARTMENT OF HEALTH
RADIOACTIVE MATERIAL LICENSE

09411

Pursuant to the Texas Radiation Control Act and Texas Department of Health regulations on radiation, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Texas Department of Health now or hereafter in effect and to any conditions specified below.

LICENSEE	This license issued pursuant to and in accordance with
1. Name: Nuclear Sources and Services, Inc. DBA NSSI/Recovery Services, Inc. ATTN: Mr. Robert D. Gallagher	☐ APPLICATION ☒ LETTER ☐ _____ Dated: September 29, 1983 Signed By: Robert D. Gallagher
2. Address: P. O. Box 34042 Houston, Texas 77034	3. License Number: L01811 / Amendment Number: 42 PREVIOUS AMENDMENTS ARE VOID 4. Expiration Date: April 30, 1995

RADIOACTIVE MATERIAL AUTHORIZED

5. Radioisotope	6. Form of Material	7. Maximum Activity*	8. Authorized Use
A. Any radioactive material.	A. Radioactive Waste as defined in Texas Regulations for Control of Radiation (TRCR) 44.2	A. Activities of groups as specified under TRCR 44.5(a) for a Class B Processing Facility not to exceed the following: Group I. 1 Ci Group II. 10 Ci Group III. 100 Ci Group IV. 1000 Ci	A. Receipt from other persons, processing, research and development, and transfer to licensed radioactive waste disposal sites or other licensed recipients.

☒ CONTINUED ON PAGE 2, IF CHECKED.

CONDITIONS

9. Radioactive material shall be used only at:

Subsite Number	Location
000	Houston - 5711 Etheridge (this address shall consist of all properties operated by the licensee within an area bounded on the north by Moline Street, on the south by Joyner Street, on the east by Northdale Street,

* Ci-Curies mCi-Millicuries μ Ci-Microcuries

CONDITIONS CONTINUED ON PAGE 3

TEXAS DEPARTMENT OF HEALTH
RADIOACTIVE MATERIAL LICENSE

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Supplementary Sheet

LICENSE NUMBER	AMENDMENT NUMBER
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5. Radio-isotope	6. Form of Material	7. Maximum Activity	8. Authorized Use
B. Any radioactive material.	B. Radio-active Waste as defined in TRCR 44.2.	B. Activities of groups as specified under TRCR 44.5(a) for a Class B Storage Facility not to exceed the following: Group I. 2 Ci Group II. 20 Ci Group III. 200 Ci Group IV. 2000 Ci	B. Receipt from other persons, storage, and transfer to licensed radioactive waste disposal sites or other licensed recipients.
C. Any radio-active material	C. Sealed sources received as radioactive waste	C. Total activity not to exceed 2000 Ci	C. Receipt from other persons, storage, processing and transfer to licensed radioactive waste disposal sites or other licensed recipients.
D. Special Nuclear Material	D. Any received as radioactive waste	D. As specified in TRCR 11.2 "Special Nuclear Material in Quantities not Sufficient to Form a Critical Mass"	D. Receipt from other persons, storage, processing and transfer to licensed radioactive waste disposal sites or other licensed recipients.

CONDITIONS CONTINUED ON PAGE 3

TEXAS DEPARTMENT OF HEALTH
RADIOACTIVE MATERIAL LICENSE
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LICENSE NUMBER	AMENDMENT NUMBER
L01811	42

CONDITIONS CONTINUED:

9. (continued)

and on the west by Cheswood Street, and is further identified as Block 37, lots 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 17, and 18, and Block 38, lots 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 18 in Houston, Texas as indicated in Attachment 1, which is attached hereto and is made a part hereof).

10. The licensee shall comply with the provisions of TRCR Parts 11, 12, 13, 21, 22, 41, and 44.

11. The activities authorized by this license shall only be performed by individuals designated by the licensee's Radiation Safety Committee or by persons working under the direct supervision of persons designated by the licensee's Radiation Safety Committee.

12. The individual designated to perform the functions of Radiation Safety Officer (RSO) for activities covered by this license is Robert D. Gallagher.

13. The licensee is authorized to possess special nuclear material only in quantities not to exceed that specified in TRCR 11.2. The total amount of special nuclear material possessed under all licenses issued by this Agency at the licensee's facility described in Condition No. 9 shall not exceed the TRCR 11.2 limits.

14. A. The licensee is authorized to collect and repackage radioactive waste at customer sites throughout Texas and transport the radioactive waste in containers that comply with United States Department of Transportation (USDOT) specifications to the licensee's or other properly licensed facility.

B. Waste processing under this license is limited to that as defined by the TRCR and the following:

(1) Receipt and survey in accordance with procedures contained in the application dated September 29, 1983 and letter dated September 14, 1984;

CONDITIONS CONTINUED ON PAGE 4

TEXAS DEPARTMENT OF HEALTH
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CONDITIONS CONTINUED:

14. B. (continued)

(2) Repackaging in accordance with procedures contained in the application dated September 29, 1983;

(3) Compaction and consolidation in accordance with procedures contained in the application dated September 29, 1983;

(4) Separation and processing of liquid scintillation media, containers, and other bulk liquid and solid waste into: (a) liquid fractions; (b) solid fractions; and (c) rinses in accordance with procedures contained in the application dated September 29, 1983 and letter dated September 14, 1984.

(5) Solidification of liquid radioactive waste using media acceptable to low-level waste disposal sites.

15. Empty or processed liquid scintillation vials may be disposed of in accordance with TRCR 21.307 (a) without regard to their radioactivity if: (1) concentrations of carbon-14, hydrogen-3, or iodine-125 do not exceed .05 microcuries per gram; or (2) for any other radionuclide, concentrations which do not exceed TRCR Appendix 21-A, Table II, Column 2 limits.

The determination of concentration shall be made with at least a 100 gram sample collected from each process batch.

16. While on site, waste will remain physically identifiable as radioactive waste and traceable to waste receipt records until shipment for disposal.

17. A. Waste inventory shall be computed in units of, or equivalent to the volume of 55-gallon drums (7.35 cubic feet). When computing the total inventory, any drum or container not equal to the volume of a 55-gallon drum shall be included in the inventory as its 55-gallon drum equivalent (e.g., a 30-gallon container has a volume equal to 30/55 of a 55-gallon drum).

B. Any container that contains any quantity of radioactive waste shall be counted as a full container in the drum equivalent inventory unless it can be readily verified as empty.

CONDITIONS CONTINUED ON PAGE 5

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RADIOACTIVE MATERIAL LICENSE

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CONDITIONS CONTINUED:

17. (continued)

C. By January 15, April 15, July 15 and October 15 of each year the licensee shall submit a written report to the Agency which includes the following information about the preceding calendar quarter:

(1) The number of drum equivalents and activity on hand at the beginning and end of the quarter;
(2) The number of drum equivalents and activity received during the quarter;
(3) The number of drum equivalents and activity processed during the quarter;
(4) The number of drums or drum equivalents disposed of at a licensed low-level radioactive waste disposal site; and
(5) Volume and activity of waste disposed of in accordance with TRCR 21.307(a) and the identity of the disposal site (e.g., the name of the municipal landfill, incinerator, etc.) and the date of each disposal.

D. No more than 4000 55-gallon drum equivalents of radioactive waste shall be possessed at any one time.

18. A. The outer surfaces of each container shall be wipe tested for removable contamination upon receipt or repackaging and just prior to transfer. Any container with removable contamination in excess of 2200 dpm/100 cm^2 (alpha) or 22000 dpm/100 cm^2 (beta-gamma) shall be decontaminated. Drum storage area floors shall be wipe-tested at least quarterly to confirm that containers are not leaking radioactive materials.

B. Containers shall be visually inspected at least quarterly. Any container showing signs of rusting, physical damage, leaking materials, or other deterioration shall be repackaged as soon as practicable, but not later than ten days.

C. Upon receipt, the surface of each container shall be surveyed individually to assess the external radiation fields present and a record made of the highest surface reading noted.

CONDITIONS CONTINUED ON PAGE 6

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CONDITIONS CONTINUED:

19. Records of all environmental sampling results; visual and physical inspections; radiation surveys; bioassay; personnel monitoring; personnel contamination surveys; radioactive material receipt, transfers, and disposals; management safety audits; biweekly wipe surveys of any restricted and unrestricted areas; area surveys and other records required by TRCR and this license shall be maintained by the licensee, in accordance with the time limits specified by the TRCR, for inspection by the Agency.

20. A. Shipments of radioactive waste by the licensee shall meet the requirements of the U.S. DOT, as specified in Title 49 Code of Federal Regulations and the requirements of the waste disposal site to which they are being shipped.

B. The licensee is authorized to store any package prepared for shipment containing waste byproduct, source or special nuclear material in truck trailers at the licensee's facility for periods not to exceed ten working days prior to transport to a disposal site.

21. The licensee shall maintain for inspection by the Agency an inventory of all radioactive waste possessed under this license. The inventory shall show the radionuclide, date received, from whom received, amount of activity, physical form, date processed, original and reassigned drum or container number, and the date transferred for disposal. In addition, the licensee shall at least monthly generate a cumulative inventory, by radionuclide, which demonstrates compliance with the appropriate processing group limits of TRCR 44.5.

22. A. The clothing and skin of all employees (including permanent and contract workers) working in a radiation restricted area shall be monitored with radiation detecting instrumentation for contamination prior to departure from the facility. Contamination exceeding 20 dpm/100 cm^2 (alpha) and/or 1,000 dpm/100 cm^2 (beta-gamma) shall be removed prior to an individual departing the radiation restricted area.

CONDITIONS CONTINUED ON PAGE 7

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CONDITIONS CONTINUED:

22. (continued)

B. Areas found to possess contamination in excess of 2200 dpm/100 cm^2 (removable alpha) and/or 22,000 dpm/100 cm^2 (removable beta-gamma) shall be decontaminated and resurveyed to assure that removable contamination is below the aforementioned limits. The limits do not apply to the contents of properly packaged waste materials, to waste materials during processing, or to the inner surfaces of processing equipment and air handling, sampling, or exhausting equipment.

23. A. Radiation safety training shall be given to radiation workers and radiation safety technicians in accordance with the licensee's letter dated September 14, 1984. All permanent radiation workers shall attend the "Radiation Workers Training Program" within 30 days of employment and shall attend the "Respirator Training Program" prior to working in areas requiring respiratory protection.

B. Contract or temporary workers working in any radiation restricted area will work only under the direct supervision of a Radiation Safety Technician and shall not work in any radiation restricted area alone.

C. All female employees who enter any radiation restricted area will be given instruction concerning prenatal radiation exposure.

D. All training will be documented. Documentation of the training shall be made available for Agency inspection.

24. The licensee shall provide appropriate respiratory protection for persons working in areas where airborne contamination at concentrations above the limits specified in TRCR Appendix 21-A, Table I, Column I is possible. A physical inspection to include wipe testing of the respirator shall be performed before each use, but not less frequently than quarterly. Persons working in those areas shall be tested for proper fit of respirators at least once each year. Records of the physical inspection, fit test and training given to employees shall be maintained for inspection by the Agency.

CONDITIONS CONTINUED ON PAGE 8

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Supplementary Sheet

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CONDITIONS CONTINUED:

25. Respirators made available for use must show no removable alpha contamination in excess of 22 dpm/100 cm^2, no removable beta-gamma contamination in excess of 220 dpm/100 cm^2, no fixed alpha contamination in excess of 100 dpm/100 cm^2, or no fixed beta-gamma contamination in excess of 1,000 dpm/100 cm^2.

26. Individuals involved in operations which utilize, during any 24-hour period, more than 50 millicuries of iodine-125 (I-125) and/or iodine-131 (I-131) or unvented operations involving 10 millicuries of I-125 and/or I-131 in a noncontained form shall have bioassays performed within one week. If the use of I-125 and/or I-131 is on a continual basis, bioassays shall be performed once every two weeks. The action points listed below shall be observed:

A. Whenever the thyroid burden at the time of measurement exceeds 0.12 microcuries of I-125 or 0.04 microcuries of I-131, the following actions shall be taken:

(1) An investigation of the operations involved, including ventilation surveys, shall be carried out immediately to determine the causes of exposure and to evaluate the potential for further exposures.
(2) If the investigation indicates a potential for excessive worker exposure, access will be controlled until the source of exposure is discovered and corrected.
(3) Corrective actions that will eliminate or lower the potential for further exposures shall be implemented.
(4) A repeat bioassay shall be taken within one week of the previous measurement in order to confirm the effectiveness of the corrective action taken.
(5) Reports or notification shall be provided as required by TRCR 21.405 and 21.408.

B. If the thyroid burden at any time exceeds 0.5 microcuries of I-125 or 0.14 microcuries of I-131, the following actions shall be taken:

(1) Prevent the individual from any further handling of I-125 or I-131 until the thyroid burden is below the above limits.
(2) Carry out all steps described above.

CONDITIONS CONTINUED ON PAGE 9

TEXAS DEPARTMENT OF HEALTH
RADIOACTIVE MATERIAL LICENSE

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CONDITIONS CONTINUED:

26. B. (continued)

(3) As soon as possible, refer the case to appropriate medical consultation for recommendations regarding therapeutic procedures that may be carried out to accelerate removal of radioactive iodine from the body. This should be done within 2-3 hours after exposure when the time of exposure is known so that any prescribed thyroid blocking agent would be effective.

(4) Carry out repeated measurements at approximately one-week intervals at least until the thyroid burden is less than 0.12 microcuries of I-125 or 0.04 microcuries of I-131.

27. A. Individuals involved in operations which utilize, at any one time, more than 100 millicuries of hydrogen-3 in a noncontained form, other than metallic foil, outside of a glovebox shall have bioassays performed within one week following a single operation and at weekly intervals for continuing operations.

B. Hydrogen-3 shall not be used in such a manner as to cause any individual to receive a radiation exposure such that urinary excretion rates exceed 28 microcuries of hydrogen-3 per liter when averaged over a calendar quarter.

C. A report of an average concentration in excess of the limit specified in Part B of this condition for any individual shall be filed, in writing, within 30 days of the end of the calendar quarter with the Agency. The report shall contain the results of all urinalysis for the individual during the calendar quarter, the cause of the excessive concentrations, and the corrective steps taken or planned to assure against a recurrence.

D. Any single urinalysis which discloses a concentration of greater than 50 microcuries per liter shall be reported, in writing, within seven days of the licensee's receipt of the results.

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CONDITIONS CONTINUED:

28. A. If air sample results indicate that an airborne release in excess of ten times the limits of TRCR Appendix 21-A, Table I, Column 1 occurred to the restricted area or to any portion of the restricted area, the licensee shall immediately perform bioassays on all individuals who were present. If the bioassay results indicate that the maximum permissible body burden was exceeded for any individual; the individual shall have a whole body count performed to determine the uptake, if appropriate for the radionuclide. Appropriate measures to enhance elimination shall be made in consultation with the licensee's consulting physician.

B. If any air sample results indicate that an airborne release to the unrestricted area in excess of the limits of TRCR Appendix 21-A, Table II, Column 2 has occurred, the licensee shall take appropriate measures to determine the dose to the maximally exposed member of the public downwind of the plume and notify the Agency in writing within five working days of the sample analysis and the dose assessment.

29. Records of bioassays, thyroid counts, whole-body exposures, any dose to employees or members of the public and any corrective actions taken shall be maintained for Agency inspection.

30. The licensee shall conduct the radiation survey and area monitoring program as described in Sections 5.2, 5.3, and 5.4 of the document entitled "Operating Procedures for the Radioactive Waste Processing and Storage Facilities at Houston, Harris County" dated September 1983, at the locations indicated in Drawing No. 100-83023-B, "Site Plan - Nuclear Sources and Services Inc." dated August 10, 1983. The monitoring program will be reviewed at least semiannually by the Radiation Safety Committee to assure its adequacy for the size and scope of operations at the facility. A report of its analyses shall be kept for Agency inspection.

31. Once each calendar quarter the licensee shall collect three environmental soil samples from the following locations:

A. South of the NSSI office building, west of 5747 Etheridge, just west of the fence on the east side of Etheridge, on the south side of the driveway, in the low drainage area;

CONDITIONS CONTINUED ON PAGE 11

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CONDITIONS CONTINUED:

31. (continued)

B. Southwest of the NSSI office building, just west of the fence on the east side of Etheridge, just south of the main gate drive where the slab drainage exists at the site.

C. Southwest of the NSSI office building, just west of the fence on the east side of Etheridge, on the south side of the driveway to the drum storage area and waste storage and processing building, in the low drainage area.

32. The RSO and the Radiation Safety Committee shall review the following areas of the radiation safety program at least semiannually:

A. health physics authority and responsibility;
B. operating procedures (involving the handling, processing and/or storage of radioactive materials);
C. audits, inspections, and surveys conducted by the facility RSO (for timeliness and the resolution of any problems);
D. radiation protection including employee exposure records; bioassay procedures and results; quarterly, semiannual, or annual surveys and inspections; radiological survey and sampling data; and any changes in operating procedures;
E. radiation safety training;
F. respiratory protection program;
G. facility and equipment design including ventilation rates within various portions of the facility, and fire control;
H. control of airborne radioactive materials;
I. compliance with applicable federal and state regulations and the conditions of this license; and
J. the audit of drum inspection and receipt procedures.

A copy of this report shall be maintained for review by the Agency.

33. Modifications of existing facilities or construction of a new facility requiring a change in the operating procedures or the use of new radioisotope handling facilities shall be approved by the Agency prior to the initiation of their use on a commercial scale.

CONDITIONS CONTINUED ON PAGE 12

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RADIOACTIVE MATERIAL LICENSE

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CONDITIONS CONTINUED:

34. A. The licensee shall post and maintain financial security.

B. Financial security shall be in the form of a preapproved trust agreement with the Agency designated as the beneficiary.

C. The amount of financial security shall be based on the average number of drum-equivalents of radioactive waste, as determined from a count obtained during the two inspections made during the prior year. The amount of financial security required shall be reviewed on a yearly basis and adjusted to reflect the average number of drums as determined during the two semi-annual inspections. No adjustment shall be made downward unless the total amount of security equals the total amount required by the Agency based on the preceding year's average drum count.

D. The initial amount of financial security is $225,000, based upon $300 per drum-equivalent of radioactive waste counted on-site during the two inspections conducted prior to issuance of Amendment No. 42 of this license. This amount is to be paid as provided in Parts E and F of this condition.

E. The initial payment to the trust fund shall be in the amount of $56,250.

F. Payments to the trust fund shall be made on a semi-annual basis (June 1 and December 1) until the total amount of financial security required is attained. The semi-annual payments shall be in the amount of $2.00 for every cubic foot of radioactive waste received during the six month period.

G. In no event shall the amount of the security be less than $56,250. This amount may be reviewed annually.

35. The licensee shall provide the Agency a Certificate of Insurance which indicates that the requirements of TRCR 44.30(c) have been fulfilled. Should the licensee be unable to obtain such insurance coverage, every six months the licensee shall submit documentation of attempts to obtain the liability insurance and a request for exemption from TRCR 44.30(c).

CONDITIONS CONTINUED ON PAGE 13

TRC FORM 41-3a
(2/88)

TEXAS DEPARTMENT OF HEALTH
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CONDITIONS CONTINUED:

36. The licensee shall notify the Agency in writing or via telephone at least 48 hours in advance of shipping its low-level radioactive waste, including the shipment of TRCR 21.307 (a) waste, to a commercial treatment, storage, or disposal site.

37. All containers of radioactive waste shall be stored within enclosed buildings with the following exceptions:

    A. Containers may be stored outside temporarily (i.e., not to exceed one week) while being received or being prepared for shipment.

    B. Bulk flammable liquids shall be stored in accordance with local applicable fire safety regulations.

38. For research and development of waste processing techniques, the licensee is authorized to process up to 15 drum equivalents at any one time using new procedures, equipment, facilities, and technology without prior approval from the Agency. All research and development studies must be approved by the Radiation Safety Committee, and a summary report of such activities provided to the Agency at least annually.

39. Except as specifically provided otherwise by this license, the licensee shall possess and use the radioactive material authorized by this license in accordance with statements, representations, and procedures contained in the following:

    application dated September 29, 1983,
    letter dated September 14, 1984;

    The Texas Regulations for Control of Radiation shall prevail over statements contained in the above documents unless such statements are more restrictive than the regulations.

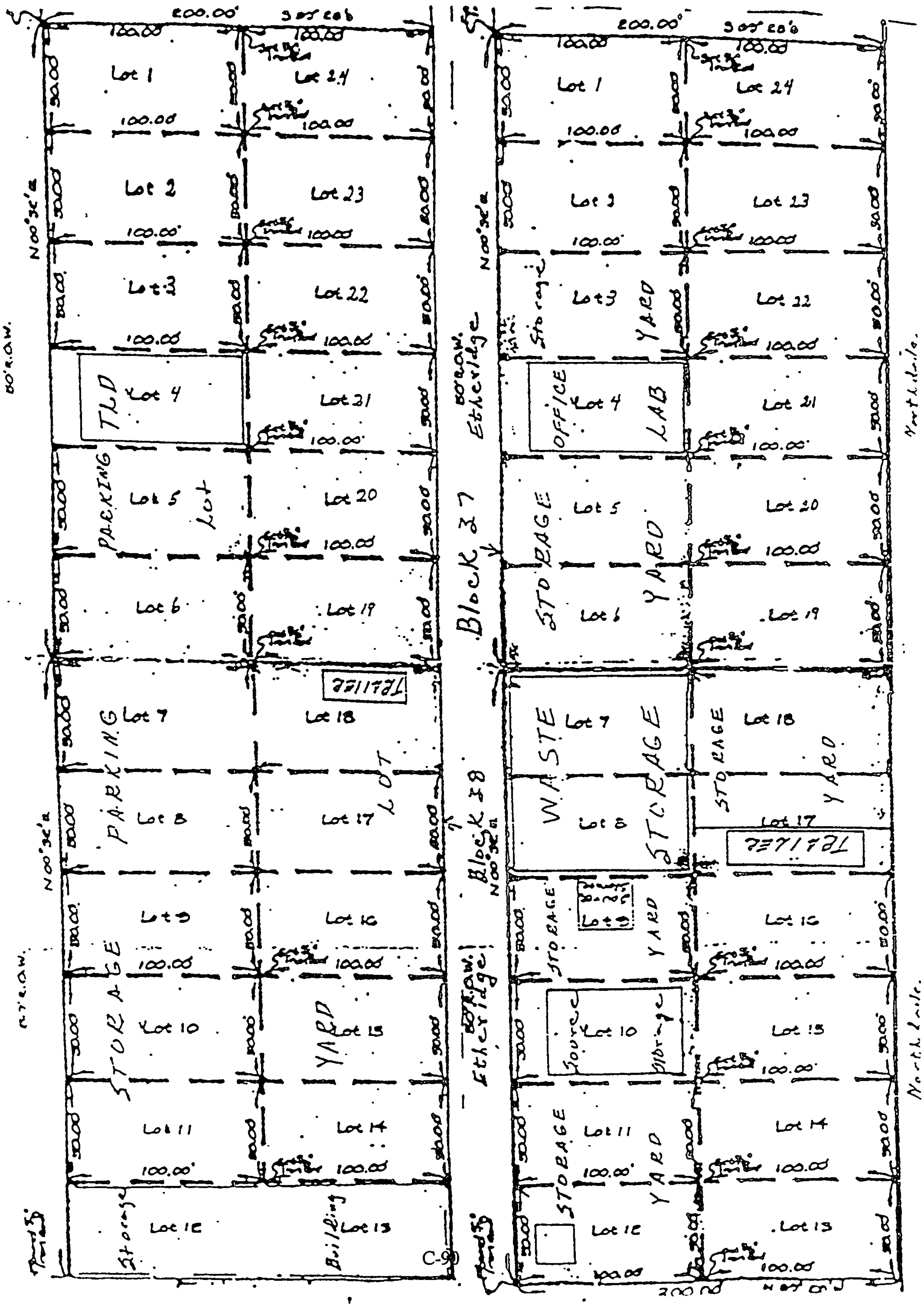
PES:dm

FOR THE TEXAS DEPARTMENT OF HEALTH

C-89

Date 2 August 1990

Robert Bernstein M.D., F.A.C.P.


Block 37
Block 38
Etheridge
North Lake
Lot 1
Lot 2
Lot 3
Lot 4
Lot 5
Lot 6
Lot 7
Lot 8
Lot 9
Lot 10
Lot 11
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Lot 13
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Lot 21
Lot 22
Lot 23
Lot 24
TLD
PARKING Lot
PARKING LOT
TELTLEE
STORAGE YARD
Storage Building
OFFICE LAB
STORAGE YARD
WASTE STORAGE
Source Storage
200.00'
100.00
50.00

EPA

ACKNOWLEDGEMENT OF NOTIFICATION OF HAZARDOUS WASTE ACTIVITY

DEC 27 1988

This is to acknowledge that you have filed a Notification of Hazardous Waste Activity for the installation located at the address shown in the box below to comply with Section 3010 of the Resource Conservation and Recovery Act *(RCRA)*. Your EPA Identification Number for that installation appears in the box below. The EPA Identification Number must be included on all shipping manifests for transporting hazardous wastes; on all Annual Reports that generators of hazardous waste, and owners and operators of hazardous waste treatment, storage and disposal facilities must file with EPA; on all applications for a Federal Hazardous Waste Permit; and other hazardous waste management reports and documents required under Subtitle C of RCRA.

EPA I.D. NUMBER → TXD982560294

NSSI/RECOVERY SVCS INC.
ROBERT GALLAGHER
P.O. BOX 34042
HOUSTON, TX. 77234

INSTALLATION ADDRESS →

5709 ETHERIDGE
HOUSTON, TX. 77087

EPA Form 8700-12A (4-80)

MAR 24 1994

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

November 18, 1993

NSSI/Recovery Services, Inc.
Attn: Robert D. Gallagher
P. O. Box 34042
Houston, Texas 77234

RE: NSSI/RECOVERY SERVICES, INC.
CLASS 2 MOD; Permit HW50269

Enclosed is a copy of:
( ) a Permit for a wastewater treatment facility issued pursuant to Chapter 26 of the Texas Water Code.

In order that you may comply with monitoring requirements for your waste discharge permit, self-reporting forms and instructions will be forwarded to you from the Watershed Management Division. Please discontinue the use of any old self-reporting forms that you may have and wait to fill out forms until you receive new ones from the TNRCC which reflect your new monitoring requirements. For further information, please contact Mary Taylor at (512) 463-8244.

When your facility is placed in operation or goes into a new phase, please use the attached "Report of Progress of Construction of Wastewater Treatment Facilities" form. This form will advise this agency and our district office of the completion or placement in operation of proposed facilities in accordance with the special provision incorporated into the permit.

(X) a Permit for a hazardous or solid waste facility issued pursuant to Art. 4477-7, Texas Revised Civil Statutes. Your attention is directed to Commission Rule 335.5 which may be applicable to your facility.

( ) a Permit for a waste disposal well or an injection well issued pursuant to Chapter 27 of The Texas Water Code. In accordance with Texas Water Code, you must file a copy of the permit with the city and county health authorities.

( ) a Permit for a municipal solid waste facility issued pursuant to Chapter 361, Texas Health and Safety Code. The Site Development Plan, the Site Operating Plan, and all other documents and plans prepared and submitted to support the permit application shall be considered as a part of this permit and shall be considered as operational requirements of this permit.

Sincerely,

Gloria A. Vasquez

Gloria A. Vasquez, Chief Clerk

GAV:de

cc: TNRCC Regional Office 12

P.O. Box 13087 • Austin, Texas 78711-3087 • 512/908-1000

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

CLASS 2 MODIFICATION TO TEXAS NATURAL RESOURCE CONSERVATION COMMISSION PERMIT NO. HW-50269 NSSI/RECOVERY SERVICES, INC.

Hazardous Waste Permit No. HW-50269 issued January 22, 1992 (ISW Reg. No. 38669) is hereby modified as follows:

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II.A.2.pp Mercury Waste Class IH Hazard Code T

II.A.2.qq Phenyl Mercury Acetate Waste Class IH Hazard Code H

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II.B.13. Tank, stainless steel, above-grade, capacity 10,000 gallons, identified as Tank No. 13 in the application (NOR No. 02), for storage and processing of wastes described in Provisions II.A.2.bb.

II.B.15. Tank, stainless steel, above-grade, capacity 10,000 gallons, identified as Tank No. 15 in the application (NOR No. 24), for storage and processing of wastes described in Provisions II.A.2.bb.

II.B.19. Tank, stainless steel, above-grade, capacity 960 gallons, identified as Grinder Tank No. 1 in the application (NOR No. 19), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., and 11.

II.B.20. Tank, stainless steel, above-grade, capacity 960 gallons, identified as Grinder Tank No. 2 in the application (NOR No. 19), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., and 11.

II.B.21. Container storage area, closed on all sides, maximum capacity 79,860 gallons, identified as Building 1 Container Storage Area in the application (NOR No. 08), for storage and processing of all authorized wastes.

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II.B.24. Container storage area, closed on all sides, maximum capacity 63,533 gallons, identified as the Building 3 Container Storage Area in the application (NOR No. 18), for storage and processing of all authorized wastes.

II.B.25. Container storage area, closed on all sides, maximum capacity 5,500 gallons, identified as the Building 4 Container Storage Area in the application (NOR No. 20), for storage and processing of all authorized wastes which are not reactive and not ignitable.

II.B.26 Container storage area, closed on all sides, maximum capacity 2,200 gallons, identified as Container Storage Area No. 5 in the application (NOR No. 21), for storage and processing of all authorized wastes.

II.B.27 Tank, mild steel, above-grade, capacity 6,200 gallons, identified as the Reactives Hydrolysis Tank in the application (NOR No. 22), for processing of all authorized wastes.

II.C.4. Neutralization, oxidation, reduction, and other chemical reactions or physical processing (e.g. distillation) to render wastes less hazardous or more suitable for off-site disposal or on-site processing in an authorized tank or container storage area.

II.C.8. Solidification or stabilization (including amalgamation) in portable equipment within an authorized container storage area.

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II.C.13. Drying of solids to render the waste more suitable for on-site processing or to meet off-site disposal criteria for release of water only;

II.C.14. Recovery of waste chemicals and other material for re-use or re-sale; and

II.C.15. Operation of a mercury retort unit.

II.E. The units and operational methods authorized are limited to those described herein and by the application and related plans and specifications which were included in the permit application submittals listed in Provision III.A.1. Prior to constructing or operating any unit in a manner which differs from either the related plans and specifications or the limitations of this permit, the permittee must satisfy the following requirements:

page 9 of 24

III.A.1. Facility design, construction, and operations must comply with this permit, Texas Natural Resource Conservation Commission (TNRCC) Rules, and be in accordance with the plans and specifications for design, construction and operation approved herein. All plans submitted with the application dated November 4, 1988; June 29, 1989; August 24, 1989; March 15, 1991; September 5, 1991; November 20, 1992; and July 2, 1993 are approved, subject to the terms of this permit and any other orders of the Texas Natural Resource Conservation Commission which are hereby incorporated by reference and made a part of this permit.

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IV.A.1. The permittee shall provide financial assurance for closure in accordance with the form outlined in 40 CFR Part 264, Subpart H in an initial amount not less than $1,208,576 in 1993 dollars. This financial assurance amount shall be adjusted annually as specified in Provision IV.A.2.a. Financial assurance shall be secured and maintained in compliance with Commission regulations on hazardous waste financial requirements (30 TAC Section 335.152 and 40 CFR Part 264, Subpart H).

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** The following Provision V.N. is not a part of the TNRCC permit. It is included as part of the EPA permit, enforced only by EPA.

**V.N. The permittee must comply with the requirements of 40 CFR 264 Subpart AA and Subpart BB, as applicable. Within 90 days of the effective date of this permit, the Permittee shall submit to the Director of the Hazardous Waste Management Division, EPA, Region 6, a report which must contain, at a minimum, the following information:

1. An equipment list which includes all of the information required under Part 264.1064(b)(1) for equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight, and a list of all process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air stream

stripping operations managing hazardous waste with organic concentrations of at least 10 percent by weight.

2. For the process vents listed above, the amount of vent emissions in lb/hr or kg/hr, and in lb/yr or kg/yr.

3. If emissions in Provision V.N.2. of this section exceed limits cited in Part 264.1032(a)(1), the report must detail the manner in which compliance will be obtained, i.e., by the reduction of total emissions to the limits in Part 264.1032(a)(1), or reduction by means of a control device per Part 264.1032(a)(2).

4. If a closed vent system and control device is installed to comply with the requirements in Part 264.1032(a)(2), provide the following:

   a. An implementation schedule that includes dates by which the closed vent system and control device will be installed and in operation (Part 264.1033(a)(2)).

   b. The type of control device under Part 264.1033 to be installed (e.g., vapor recovery, vapor recovery, flare etc...).

5. If the permittee feels any of the requirements of Provision applicable to this facility, the permittee must provide justification for this decision as part of the report.

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VII.A. The permittee shall follow the contingency plan, developed in accordance with 40 CFR Part §264, Subpart D, and included with application submittals listed in Provision III.A.1., which is hereby approved subject to the terms of this permit and any other orders of the Texas Natural Resource Conservation Commission. The contingency plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and

conditions of this permit upon the date of approval by the Commission.

VII.B. The permittee shall follow the inspection plan and inspection schedule, developed in accordance with 40 CFR Part §264.15, and included with application submittals listed in Provision III.A.1., which are hereby approved subject to the terms of this permit and any other orders of the Texas Natural Resource Conservation Commission. The inspection plan and schedule are hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of this permit upon the date of approval by the Commission.

VII.C. Facility closure shall be completed in accordance with the requirements of 31 TAC §335.152 and 40 CFR Part 264, Subpart G, and included with the application submittals listed in Provision III.A.1., which are hereby approved subject to the terms if this permit and any other orders of the Texas Natural Resource Conservation Commission. The closure plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of this permit upon the date of approval by the Commission.

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VII.D. The permittee shall follow the waste analysis plan, developed in accordance with 40 CFR Part §264.13, and included with application submittals listed in Provision III.A.1., which is hereby approved subject to the terms of this permit and any other orders of the Texas Natural Resource Conservation Commission. The waste analysis plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of this permit upon the date of approval by the Commission.

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X. Annual Environmental Audit

A. Within the first year after Commission action on the permit, the facility owner or operator shall provide notice to affected persons of intent to have an

independent annual environmental audit of the facility performed.

1. The notice shall state the names of at least three independent inspectors nominated by the facility owner or operator to perform the environmental audit and shall be published in the newspaper of the largest general circulation in the country in which the facility is located. The facility owner or operator shall not nominate an inspector who is employed or who has been employed by the facility.

2. The notice shall announce a meeting time and place, to be located near the facility location, be held within 15 days of the published notice in order for the facility to receive comments from and allow for participation by interested affected persons in the selection of the independent inspector. The interested affected persons may either agree to one of the nominated independent inspector or nominate other independent inspectors if they do not approve of the nominee list. The selection of the independent shall be agreed to by the facility owner or operator and the interested affected persons no later than 30 days from the date of the meeting. The name of the selected independent inspector shall be submitted to the Commission no later than 15 days from the date of selection for the Commission's approval. The Commission shall approve the independent inspector after it has determined that the independent has the necessary expertise to perform the audit and does not have a conflict of interest with any of the parties involved in the inspector selection.

3. The published notice may not be smaller than 96.8 square centimeters or 15 square inches with the shortest dimension at least 7.6 centimeters or three inches and shall contain at a minimum, the following information:

   a. the facility owner's or operator's name;

   b. the location of the facility;

   c. the facility permit number;

d. the time and date of the scheduled annual environmental audit;

e. names of at least three nominated independent inspectors;

f. the date and time and location of the selection meeting; and

g. the name and telephone number of a facility contact person.

4. The facility owner or operator shall provide a copy of the published notice to local jurisdictions where the facility is located.

5. The facility owner or operator shall provide the Commission with an affidavit including a newspaper tear sheet of the published notice and sworn statement of the editor or publisher certifying that the notice was given as required by this section. Acceptance of the affidavit creates a rebuttable presumption that the applicant has complied with this requirement.

B. If the facility owner or operator and interested affected persons cannot agree on the selection of an independent inspector within the time frame specified in Provision X.A.2. the Commission shall select an independent inspector. The Commission's selection, however, shall not be limited to either the facility owner or operator's nominee list or the interested affected persons' nominee list. The Commission shall take steps to assure that the independent inspector or entity selected to perform the audit has the necessary expertise to perform the audit, is not a business competitor of the facility, and does not have a conflict of interest with any of the parties involved in the inspector selection.

C. The facility owner or operator shall pay the cost of notice required to be provided.

D. The facility owner or operator shall be responsible for the costs of an independent annual environmental audit. The facility owner or operator shall also maintain

responsibility for producing the selected independent inspector. The Commission shall not be a party to such procurement nor warrant the workmanship of the selected inspector.

E. The facility owner or operator shall submit the results of an independent annual environmental audit to the Executive Director, and must mail a copy of the audit to those affected persons who participated in the section of the independent inspector.

F. The scope of the independent annual environmental audit may encompass any and all provisions of environmental permits required for the facility and all relevant statutes and regulations regarding the management of the facility. If the facility is not operational, the audit shall be based on plans and specifications.

G. The facility is not required to perform the annual independent environmental audit if the facility receive any comments from affected persons. If the facility performs the independent audit despite lack of response, the facility must obtain the Commission's approval of the selected independent inspector prior to the audit. The facility shall repeat the selection process after a year when the audit is not required.

H. An affected person is any person who is a resident of the county, or of any county adjacent or contiguous to the county in which a hazardous waste management facility is to be located, including any person who is doing business or owns land in the county or adjacent or contiguous county and any local government. Such person affected shall also demonstrate to the Commission that he has suffered or will suffer actual injury or economic damage.

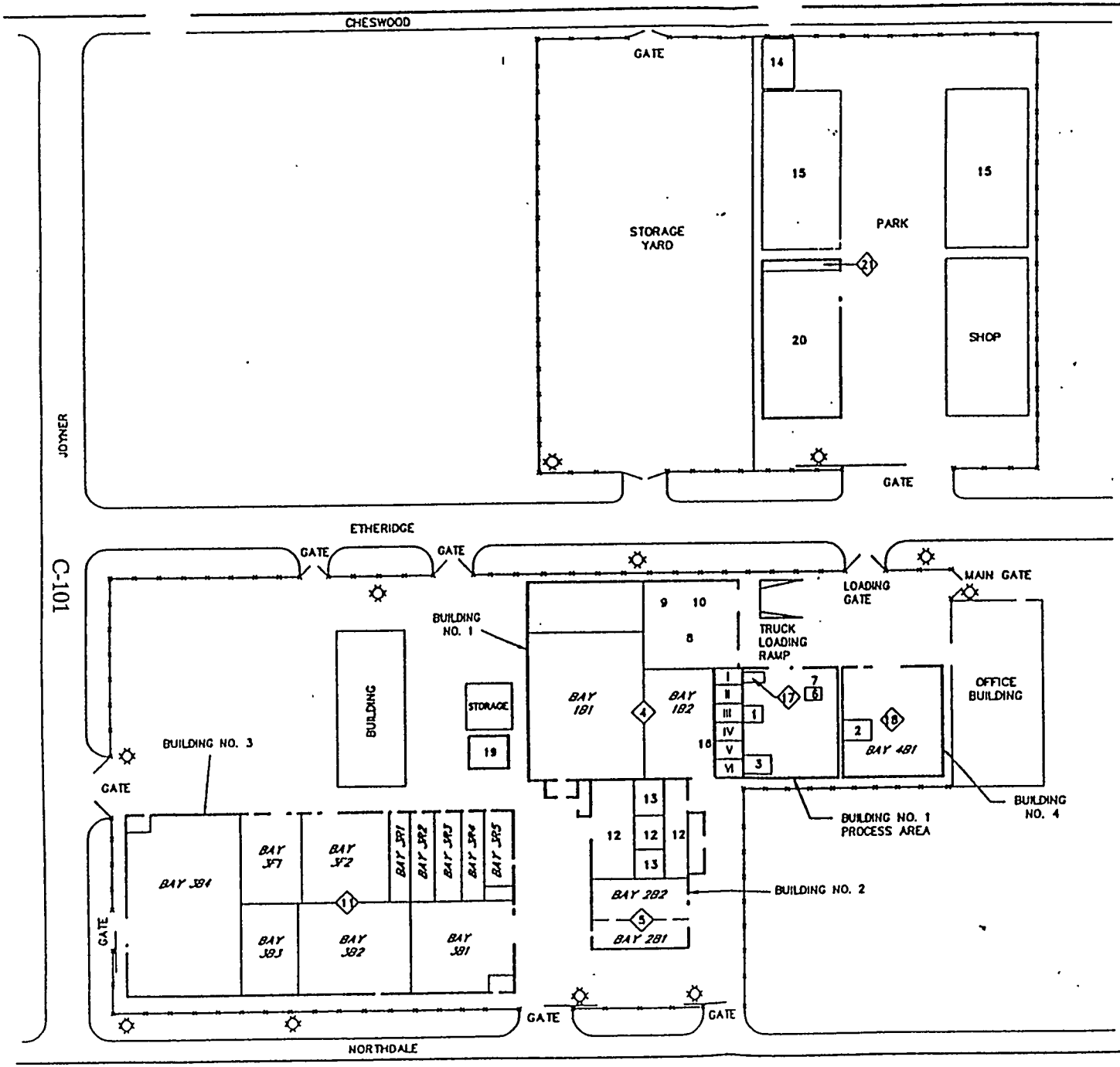
I. The inspector may be a company rather than an individual. The same inspector may be used for the second and following years, but the selection process must be repeated before a different inspector may be used.

This Class 2 Modification is part of the Hazardous Waste Permit and should be attached thereto.

APPROVED: NOV 10 1993

ATTEST: Gloria A. Vazquez

John Hall
For the Commission



LEGEND

1 ACID-BASE NEUTRALIZATION UNIT
2 SOLVENT RECOVERY AREA
3 CHEMICAL OXIDATION/REDUCTION AREA
4 CONTAINER STORAGE AREA NO. 1
5 CONTAINER STORAGE AREA NO. 2
6 SCINTILLATION MEDIA CONSOLIDATION AREA
7 MECHANICAL SEPARATION AREA
8 UNDERGROUND WASTEWATER TANKS (CLOSED)
9 SOLIDS CLEANING AREA
10 CHEMICAL STABILIZATION AREA
11 CONTAINER STORAGE AREA NO. 3
12 BLENDING/SEPARATION/STORAGE TANKS
13 WASTEWATER TANKS
14 REFRIGERATED STORAGE
15 EMPTY CONTAINER STORAGE AREA
16 LAB-BAY AREA (I THROUGH VI)
17 REACTIVE CONTAINER STORAGE AREA
18 CONTAINER STORAGE AREA NO. 4
19 REACTIVES HYDROLYSIS UNIT
20 MERCURY RETORT UNIT
21 CONTAINER STORAGE AREA NO. 5
SODIUM VAPOR LIGHT

0 50 100
SCALE IN FEET

EC-Applied, Inc.
Environmental Consulting

FIGURE II-1-1
SECURITY MAP
NSSI/RECOVERY SERVICES, INC.

DRAWN BY	DATE	PROJ NO
LMG	7-2-93	111011

TEXAS WATER COMMISSION

PROTECTING TEXANS' HEALTH AND SAFETY BY PREVENTING AND REDUCING POLLUTION

February 3, 1993

NSSI/Recovery Services, Inc.
5711 Etheridge Street
Houston, TX 77087

RE: NSSI/RECOVERY SERVICES, INC.
CLASS 2; Permit HW50269

Enclosed is a copy of:

( ) a Permit for a wastewater treatment facility issued pursuant to Chapter 26 of the Texas Water Code. In order that you may comply with monitoring requirements for your waste discharge permit, self-reporting forms and instructions will be forwarded to you from the Watershed Management Division. If you have these forms on hand, please continue using them until new forms are sent. When your facility is placed in operation or goes into a new phase, please use the attached "Report of Progress of Construction of Wastewater Treatment Facilities" form. This form will advise this agency and our district office of the completion or placement in operation of proposed facilities in accordance with the special provision incorporated into the permit.

( ) a Permit for a hazardous or solid waste facility issued pursuant to Art. 4477-7, Texas Revised Civil Statutes. Your attention is directed to Commission Rule 335.5 which may be applicable to your facility.

( ) a Permit for a waste disposal well or an injection well issued pursuant to Chapter 27 of the Texas Water Code. In accordance with the Texas Water Code, you must file a copy of the permit with the city and county health authorities.

( ) a Permit for a municipal solid waste site.

If there are any questions concerning this permit, please let us know.

Sincerely,

Gloria A. Vasquez

Gloria A. Vasquez, Chief Clerk

GAV:ra

cc: TWC District Office 7
Robert D. Gallagher; NSSI/Recovery Services, Inc.; P.O. Box 34042; Houston, TX 77234

P.O. Box 13087 • 1700 North Congress Avenue • Austin, Texas 78711-3087 • 512/463-7830

TEXAS WATER COMMISSION

CLASS 2 MODIFICATION TO TEXAS WATER COMMISSION PERMIT NO HW-50269
NSSI/RECOVERY SERVICES INC.

Hazardous Waste Permit No. HW-50269 issued January 22, 1992 (ISW Reg. No. 38669) is hereby modified as follows:

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II.B.24. Container storage area, closed on all sides, maximum capacity 63,533 gallons, identified as the Building 3 Container Storage Area in the application (NOR No. ___), for storage of all authorized wastes.

II.B.25. Container storage area, closed on all sides, maximum capacity 5,500 gallons, identified as the Building 4 Container Storage Area in the application (NOR No. ___), for storage and processing of all authorized wastes which are not reactive and not ignitable.

II.C.4. Neutralization, oxidation, reduction, and other chemical reactions to render wastes less hazardous or more suitable for off-site disposal or on-site processing in an authorized tank or container storage area.

II.C.8. Solidification or stabilization in portable equipment within an authorized container storage area.

page 8 of 24

II.E. The units and operational methods authorized are limited to those described both herein and by the application and related plans and specifications which were included in the permit application submittal dated November 4, 1988; June 29, 1989; August 24, 1989; March 15, 1991; September 5, 1991; and November 20, 1992. Prior to constructing or operating any unit in a manner which differs from either the related plans and specifications or the limitations of this permit, the permittee is required to:

page 9 of 24

III.A.1. Facility design, construction, and operations must comply with this permit, Texas Water Commission (TWC) Rules, and be in accordance with the plans and specifications for

design, construction and operation approved herein. All plans submitted with the application dated November 4, 1988; June 29, 1989; August 24, 1989; March 15, 1991; September 5, 1991 and November 20, 1992 are approved, subject to the terms of this permit and any other orders of the Texas Water Commission which are hereby incorporated by reference and made a part of this permit.

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IV.A.1. The permittee shall provide financial assurance for closure in accordance with the form outlined in 40 CFR Part 264, Subpart H in an initial amount not less than $692,091 in 1988 dollars plus an additional $301,859 in 1992 dollars. This financial assurance amount shall be adjusted annually as specified in Provision IV.A.2.a. Financial assurance shall be secured and maintained in compliance with Commission regulations on hazardous waste financial requirements (31 TAC Section 335.152 and 40 CFR Part 264, Subpart H).

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VII.A. Contingency Plan

The permittee shall follow the contingency plan, developed in accordance with 40 CFR Part 264, Subpart D, dated November 1, 1988, and revised July 1, 1989; August 10, 1989; August 2, 1991, and November 20, 1992 which is hereby approved subject to the terms of this permit and any other orders of the Texas Water Commission. The contingency plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of this permit upon the date of approval by the Commission.

VII.B. Inspection Schedule

The permittee shall follow the inspection schedule, developed in accordance with 40 CFR 264.15, dated November 1, 1988, and revised July 1, 1989; August 2, 1991, and November 20, 1992 which is hereby approved subject to the terms of this permit and any other orders of the Texas Water Commission. The contingency plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of this permit upon the date of approval by the Commission.

VII.C. Closure Plan

Facility closure shall be completed in accordance with the requirements of 31 TAC Section 335.152 and 40 CFR

Part 264 Subpart G and the closure plan dated November 1, 1988, and revised July 1, 1989; August 10, 1989, August 2, 1991 and November 20, 1992 which is hereby approved subject to the terms of this permit and any other orders of the Texas Water Commission. The closure plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of the permit upon the date of approval by the Commission.

VII.D. Waste Analysis Plan

The permittee shall follow the waste analysis plan developed in accordance with 40 CFR 264.13, dated November 1, 1988, and revised July 1, 1989; August 10, 1989; August 2, 1991, and November 20, 1992 which is hereby approved subject to the terms of this permit and any other orders of the Texas Water Commission. The waste analysis plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of this permit upon the date of approval by the Commission.

This Class 2 Modification is part of the Hazardous Waste Permit and should be attached thereto.

APPROVED in accordance with 31 Texas Administrative Code, Section 305.69.

Date: FEB 04 1993

John Hall, Chairman
Texas Water Commission

ATTEST: Gloria A. Vasquez
Gloria Vasquez, Chief Clerk

Legal Description

Lots Two (2), Three (3), Four (4), Five (5), Six (6), Seven (7), Eight (8), Nine (9), Ten (10), Eleven (11), Twelve (12), Thirteen (13), Fourteen (14), Fifteen (15), Sixteen (16), Seventeen (17), and Eighteen (18) of Block Thirty-seven (37), and Lots Four (4), Five (5), Six (6), Seven (7), Eight (8), Seventeen (17), Eighteen (18), Nineteen (19), Twenty (20), and Twenty (21) of Block Thirty-eight (38), of Kings Court, an addition in the City of Houston, Harris County, Texas according to the map thereof, recorded in Volume 7, Page 65, of the Map Records of Harris County, Texas.

PERMIT NO. HW-50269

REGISTRATION NO. 38669

EPA I.D. NO. TXD 982560294

This permit supersedes and replaces Permit No. HW-50269 approved October 3, 1990.

TEXAS WATER COMMISSION
Stephen F. Austin State Office Building
Austin, Texas

PERMIT FOR INDUSTRIAL SOLID WASTE MANAGEMENT SITE
issued under provisions of TEX. HEALTH & SAFETY CODE ANN. Chapter 361 (Vernon)

Name of Permittee:	NSSI/Recovery Services, Inc. P.O. Box 34042 Houston, Texas 77234
Site Owner:	Robert D. Gallager c/o NSSI/Recovery Services, Inc. P.O. Box 34042 Houston, Texas 77234
Registered Agent for Service:	Robert D. Gallager c/o NSSI/Recovery Services, Inc. P.O. Box 34042 Houston, Texas 77234
Classification of Site:	Hazardous waste storage and processing, commercial

The permittee is authorized to store and process wastes in accordance with limitations, requirements and other conditions set forth herein. This permit is granted subject to the rules of the Commission and other Orders of the Commission and laws of the State of Texas. Nothing in this permit exempts the permittee from compliance with the applicable rules and regulations of the Texas Air Control Board.

This permit will be valid until cancelled, amended or revoked by the Commission. Authorization to store and process wastes shall expire midnight, October 3, 2000.

The provisions in this permit stem from both State and Federal authority. Those provisions marked with an asterisk (*) stem from Federal authority and will implement the applicable requirements of HSWA which are not yet authorized to the State of Texas.

APPROVED, ISSUED, AND EFFECTIVE this 29th day of January 1992.

ATTEST: _____ _____
For the Commission

TWC-0080A (Rev. 03-06-90)

Table of Contents

NSSI/Recovery Services, Inc.

NAME: NSSI/Recovery Services, Inc.

I. Size and Location of Facility

A. The hazardous waste management facility is located on 18 city lots in a mixed commercial, residential and industrial area at 5711 Etheridge, Houston, Harris County, Texas. The location is described as being in watershed area 1006 of the San Jacinto River Basin (North Latitude 29° 40'32", West Longitude 95°18'24").

B. The legal description and site plan submitted in the application for Permit No. HW-50269 are hereby made parts of this permit as Attachments A and B.

II. Units and Operations Authorized

A. Wastes Authorized:

The permittee is authorized to manage hazardous and industrial solid waste listed in the application and described herein, subject to the limitations provided herein.

Wastes include those generated at this facility and from off-site sources. Any hazardous waste may be accepted from a household source.

Hazardous and industrial solid wastes authorized to be managed under this permit are limited as follows:

1. Hazard Code Group Codes (as prescribed by U. S. Environmental Protection Agency regulations) in effect upon date of permit approval:

x Ignitable (I)	x Acute Hazardous Waste (H)
x Toxic (T)	x Toxicity Characteristic (E)
x Corrosive (C)	x Reactive (R)

2. Waste Descriptions

Waste Descriptions	TWC Waste Class	Hazard Codes
a. Spent Halogenated Solvents	IH	T,E
b. Spent Non-Halogenated Solvents	IH	I,T,E
c. Acetone	IH	I
d. Benzene	IH	I,T,E
e. n-Butyl Alcohol	IH	I
f. Cumene	IH	I
g. Cyclohexane	IH	I
h. Cyclohexanone	IH	I
i. 1,4 Dioxane	IH	T
j. Ethyl Acetate	IH	I
k. Ethyl Ether	IH	I
l. Formaldehyde	IH	T

[II.A.2.]

Waste Descriptions	TWC Waste Class	Hazard Codes
m. Isobutanol	IH	I,T
n. Methanol	IH	I
o. Methyl Ethyl Ketone	IH	I,T,E
p. Methyl Isobutyl Ketone	IH	I
q. Naphthalene	IH	T
r. Pyridene	IH	T,E
s. Toluene	IH	T
t. Xylene	IH	I
u. Empty Containers	I	
v. Misc. Chemical-contaminated Materials	IH	I,C,R,E,H,T
w. Labpacks and Containers to be Consolidated into labpacks	IH	I,C,R,E,H,T
x. Oil and Solvents	IH	I,T,E
y. Paint Sludge	IH	I,C,E,H,T
z. Paint Sludge containing Chlorinated Solvents	IH	I,C,E,H,T
aa. Cyanides	IH	R,T
bb. Wastewater containing Organics, Metals, and Oil	IH	E,H,T
cc. Organic Liquids	IH	I,E,H,T
dd. Sludge from Oxidation/Reduction	IH	I,C,E,H,T
ee. Solids from Solvent Still	IH	I,E,H,T
ff. Stabilized Waste	IH	E,H,T
gg. Sludge from Blending/Separation/ Storage Tanks	IH	I,C,E,H,T
hh. Waste Carbon Adsorption Media and Solids	IH	I,E,H,T
ii. Waste Ion Exchange Media and Solids	IH	C,E,H,T
jj. Filter Solids and Media	IH	I,C,E,H,T
kk. Hazardous Solid Material	IH	I,C,E,H,T,R
ll. Consolidated Hazardous Liquids	IH	I,C,R,E,H,T
mm. Consolidated Hazardous Solids	IH	I,C,R,E,H,T
nn. Blended Hazardous Waste Fuel	IH	I,C,E,R
oo. Compressed Hazardous Waste Gas	IH	I,C,E,R,H,T

3. Mixed Radioactive and Hazardous Wastes

So long as the permittee shall hold and abide the restrictions of a radioactive materials license from the Texas Department of Health, radioactive or nuclear waste materials (i.,e., waste material which emits ionizing radiation spontaneously) which also fit the waste descriptions in Provision II.A.2. above may be received from off-site and managed in accordance with the provisions of this permit.

[II.A.]

4. Prohibited Wastes and Waste Limitations:

Explosive material as defined by the Department of Transportation (DOT) under 49 CFR 173.

5. Prior to accepting any additional wastes with chemical characteristics similar to those authorized by Provision II.A.2., the permittee shall satisfy the following requirements:

a. Notify the Executive Director;

b. Provide a characterization of the waste demonstrating its similarity;

c. Submit, upon request of the Executive Director, sufficient information to ascertain similarity of the waste material. If the Executive Director determines the material is not similar, the permittee must obtain a permit amendment before accepting the waste.

d. Receive written response from the Executive Director informing the permittee that the material is similar to those materials authorized by Provision II.A.2. and that a permit amendment or modification is not required in order to receive the waste.

B. Units Authorized:

The permittee is authorized to operate the following units for storage and processing subject to the limitations contained herein. All waste management activities subject to permitting are to be confined to the following units:

1. Tank, stainless steel, above-grade, capacity 3,000 gallons, identified as Tank No. 1 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

2. Tank, stainless steel, above-grade, capacity 3,000 gallons, identified as Tank No. 2 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

3. Tank, stainless steel, above-grade, capacity 3,000 gallons, identified as Tank No. 3 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

NAME: NSSI/Recovery Services, Inc.

[II.B.]

4. Tank, stainless steel, above-grade, capacity 3,000 gallons, identified as Tank No. 4 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

5. Tank, stainless steel, above-grade, capacity 1,700 gallons, identified as Tank No. 5 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

6. Tank, stainless steel, above-grade, capacity 1,700 gallons, identified as Tank No. 6 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

7. Tank, stainless steel, above-grade, capacity 1,100 gallons, identified as Tank No. 7 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

8. Tank, stainless steel, above-grade, capacity 1,100 gallons, identified as Tank No. 8 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

9. Tank, stainless steel, above-grade, capacity 1,100 gallons, identified as Tank No. 9 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

10. Tank, stainless steel, above-grade, capacity 900 gallons, identified as Tank No. 10 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

11. Tank, stainless steel, above-grade, capacity 3,000 gallons, identified as Tank No. 11 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

12. Tank, stainless steel, above-grade, capacity 1,700 gallons, identified as Tank No. 12 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

[II.B.]

13. Tank, stainless steel, above-grade, capacity 10,000 gallons, identified as Tank No. 13 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.bb.

14. Tank, stainless steel, above-grade, capacity 10,000 gallons, identified as Tank No. 14 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., ll., and nn.

15. Tank, stainless steel, above-grade, capacity 10,000 gallons, identified as Tank No. 15 in the application (NOR No. 07), for storage and processing of wastes described in Provisions II.A.2.bb.

16. Tank, stainless steel, above-grade, capacity 1,300 gallons, identified as Acid-Base Neutralization Tank in the application (NOR No. 03), for storage and processing of all authorized acids and bases.

17. Tank, carbon steel, glass-lined, above-grade, capacity 650 gallons, identified as the 600-gallon Oxidation-Reduction Tank in the application (NOR No. 04), for processing of all authorized wastes.

18. Tank, carbon steel, glass-lined, above-grade, capacity 360 gallons, identified as the 400-gallon Oxidation-Reduction Tank in the application (NOR No. 04), for processing of all authorized wastes.

19. Tank, stainless steel, above-grade, capacity 960 gallons, identified as Grinder Tank No. 1 in the application (NOR No. 16), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., and ll.

20. Tank, stainless steel, above-grade, capacity 960 gallons, identified as Grinder Tank No. 2 in the application (NOR No. 16), for storage and processing of wastes described in Provisions II.A.2.a.-t., x., cc., and ll.

21. Container storage area, closed on all sides, maximum capacity 79,860 gallons, identified as the Building 1 Container Storage Area in the application (NOR No. 08), for storage and processing of wastes described in Provisions II.A.2.a.-nn.

[II.B.]

22. Container storage area, closed on all sides, maximum capacity 29,700 gallons, identified as the Building 2 Container Storage Area in the application (NOR No. 17), for storage and processing of all authorized wastes which are not reactive and not ignitable.

23. Container storage area, containing two "explosive" storage buildings, each closed on all sides, maximum capacity 500 gallons, identified as the Reactive Container Storage Area in the application (NOR No. 12), for storage of all authorized reactive wastes.

24. Container storage area, closed on all sides, maximum capacity 33,215 gallons, identified as the Building 3 Container Storage Area in the application (NOR No. __), for storage of all authorized wastes.

C. Functions Authorized:

The permittee is authorized to perform the following functions, subject to the limitations contained herein:

1. Blending of wastes to form a fuel for use off-site;

2. Consolidation of waste containers into lab packs;

3. Breaking down lab packs for re-consolidation for off-site disposal or on-site processing;

4. Neutralization, oxidation, reduction, and other chemical reactions to render wastes less hazardous or more suitable for off-site disposal or on-site processing;

5. Recycling of solvents;

6. Cleaning of cullet or particulate solids, empty drums, and equipment;

7. Centrifugation, filtration, and ion-exchange in portable equipment within an authorized container storage area;

8. Solidification or stabilization in containers within an authorized container storage area;

9. Shredding of containers for recovery of contents;

10. Consolidation of miscellaneous compatible hazardous wastes;

[II.C.]

11. Chemical and/or mechanical treatment to accomplish separation, settling, or clarification in portable equipment within an authorized container storage area;

12. Removal of hazardous constituents by absorption on solid media in portable equipment within an authorized container storage area;

13. Drying of solids to meet off-site disposal criteria for release of water only; and

14. Recovery of waste chemicals and other material for re-use or resale.

D. Authorization to operate these units is contingent upon maintenance of financial assurance pursuant to Provision IV.A.1. and maintenance of liability coverage in compliance with the requirements of, and in a form outlined in, 40 CFR Part 264, Subpart H. Authorization to begin operation of new units is contingent upon compliance with Provisions IV.A.1. and V.C. The permittee may not store or process waste unless compliant with all financial assurance requirements and liability requirements, to include all related financial assurance instruments and liability coverage instruments being in full force and effect.

E. The units and operational methods authorized are limited to those described both herein and by the application and related plans and specifications which were included in the permit application submittals dated November 4, 1988; June 29, 1989; August 24, 1989, March 15, 1991 and September 5, 1991. Prior to constructing or operating any unit in a manner which differs from either the related plans and specifications or the limitations of this permit, the permittee is required to

1. Notify the TWC and submit plans and specifications for the proposed changes; and

2. Receive written authorization of the Executive Director for such changes, if the Executive Director determines that a permit amendment or modification is not required by TWC rules.

F. Any proposed unit changes, addition of units, or expansion in capacity which has not been addressed by the terms of this permit must be authorized in accordance with TWC permit amendment or modification rules.

III. Facility Design, Construction, and Operation

A. General Design, Construction, and Certification Requirements:

1. Facility design, construction, and operation must comply with this permit, Texas Water Commission (TWC) Rules, and be in accordance with the plans and specifications for design, construction and operation approved herein. All plans submitted with the application dated November 4, 1988; June 29, 1989; August 24, 1989; March 15, 1991 and September 5, 1991 are approved, subject to the terms of this permit and any other orders of the Texas Water Commission which are hereby incorporated by reference and made a part of this permit.

2. The entire hazardous waste management facility shall be designed, constructed, operated, and maintained to prevent the release and/or migration of any hazardous waste beyond the zone of engineering control and to prevent inundation of and discharge from the areas surrounding the facility components. Each receipt, storage, and processing area, including unloading areas, shall be provided with a secondary containment system which will meet the requirements of 40 CFR 264.193 and which will collect spills and incident precipitation in such a manner as to:

a. Preclude the release from the system of any collected spills, leaks, or precipitation, except as provided in Provision III.B.2. This requirement shall be met by, at a minimum, providing a base and sides which are free of cracks or gaps and are sufficiently impervious to contain leaks, spills, or precipitation until the collected material is removed, and providing curbs or sides designed to withstand a full hydrostatic head;

b. Prevent washout of any hazardous waste by a 100-year flood;

c. Prevent run-on into the system from non-storage and processing areas; and

d. Have sufficient capacity to contain the volume of the largest tank or 10% of the total tank and/or container free liquid capacity, whichever is greater, plus (for uncovered areas) the volume of rainwater which would be collected by the 25-year, 24-hour rainfall event (9.8 in.).

3. All authorized units shall be clearly identified as numbered in Provision II.B. At a minimum, the container areas are to have signs, and the tanks are to have painted labels indicating "TWC PERMIT UNIT NO. (from Provision II.B.)," (for example, Tank 1 shall be labelled "TWC PERMIT UNIT NO. 1").

[III.A.]

4. Within seven months of October 3, 1990, or 60 days prior to use, the permittee shall construct and submit to the Executive Director and to the TWC District 7 Office as-built drawings and certifications prepared in accordance with Provision V.C. for Tanks 1-15, two Grinder Tanks, the Building 2 Container Storage Area, and the Building 3 Container Storage Area.

B. General Operational Requirements:

1. Incompatible wastes shall not be commingled in any storage or processing facility component, unless the permittee takes precautions to prevent the adverse reactions identified in 40 CFR 264.17(b). The permittee shall comply with the requirements of 40 CFR 264.17(a) for ignitable wastes.

2. Collected spills, leaks, clean-up residues, and contaminated rainfall runoff including stormwater from all waste management areas shall be removed within 24 hours after the spillage and/or rainfall event by a method(s) in Provision III.B.4.

3. The permittee shall manage all wastes within the facility unit in a manner in which particulate emissions of waste to the air meet Texas Air Control Board and Texas Water Commission requirements.

4. All contaminated water as identified by Provision III.B.5., Provision IV.B.2., and Provision IV.B.3. shall be managed by the following method(s):

a. Removal to an on-site, authorized industrial solid waste unit;

b. Discharge to the sanitary sewer, after satisfying all requirements of the City of Houston for such discharge;

c. Discharge in accordance with a washwater discharge permit and/or;

d. Removal off-site to an authorized industrial solid waste management facility.

5. The permittee shall ensure that any equipment which has come in contact with hazardous waste has been decontaminated prior to exiting the unit. At a minimum, all contaminated equipment shall be washed sufficiently to remove waste residues. All wash water generated shall be collected and disposed of in accordance with Provision III.B.4.

[III.B.]

6. The annual site activity report required by Provision V.F. shall be submitted to the TWC Central Office and District 7 Office by January 25 of each year for the preceding year's activities. This annual report shall include, at a minimum, the following information:

   a. All information and records required by 31 Texas Administrative Code (TAC) 335.154;

   b. Volume of fuel-from-waste shipped;

   c. Amounts of non-fuel materials received as waste and sold without processing;

   d. Volume of all wastes stored at the facility unit authorized in Provision II.B.; and

   e. Summary of the annual cost estimate adjustments for facility closure.

7. The permittee shall ensure that all waste analyses utilized for waste identification or verification have been performed in accordance with methods specified in the current editions of "Test Methods for Chemical Analysis of Water and Wastes" or "Test Methods for the Evaluation of Solid Waste" (SW-846) or other methods which are officially approved by the EPA. The permittee shall utilize only laboratories which follow a quality control/quality assurance program conforming to the program specified in "Test Methods for the Evaluation of Solid Waste" (SW-846).

8. The permittee shall develop and use inspection forms which include all units to be inspected and a list of all items to be inspected at each unit. Any remedial actions taken in response to unit inspections and the date of the remediation shall be included on the inspection forms.

9. The permittee shall ensure that all facility personnel handling hazardous waste successfully complete a program of classroom instruction and on-the-job training that teaches them to perform their duties in a way which ensures the facility's compliance with this permit. The permittee shall comply with 40 CFR 264.16.

10. All tanks, sumps, pumps, fire and spill control equipment, decontamination equipment, and all other equipment and structures authorized or required by this permit shall be maintained in good functional condition.

[III.B.]

11. The permittee shall comply with the security requirements of 40 CFR 264.14.

C. Tank Design, Construction, and Operation Requirements:

The permittee shall comply with the following minimum requirements for the tanks authorized by Provision II.B.:

The tanks shall be constructed and operated in such a way as to comply with the standards presented in 40 CFR 264.192-264.199.

D. Container Storage Area Design, Construction and Operation Requirements:

1. The container storage areas shall be constructed and operated in such a way as to comply with the standards presented in 40 CFR 264.171 - 264-178.

2. In addition, within 30 days of amendment issuance by the TWC, the permittee shall comply with the following minimum requirements for the container storage areas authorized by Provision II.B.

a. The permittee shall provide a nominal 30" aisle spacing between double rows of drums in adjacent drum storage rows.

b. Drums of 55 gallons or more capacity shall not be stacked more than three high;

c. Pallets shall be used between layers of stacked drums; and

d. Drums of incompatible wastes shall be separated by an impermeable barrier.

IV. Closure

A. General Closure Requirements:

1. The permittee shall provide financial assurance for closure in accordance with the form outlined in 40 CFR Part 264, Subpart H in an initial amount not less than $692,091 in 1988 dollars plus an additional $164,105 in 1991 dollars. This financial assurance amount shall be adjusted annually as specified in Provision IV.A.2.a. Financial assurance shall be secured and maintained in compliance with Commission regulations on hazardous waste financial requirements (31 TAC Section 335.152 and 40 CFR Part 264, Subpart H).

2. The permittee shall submit to the Executive Director upon request such information as may be necessary to determine the adequacy of financial assurance.

[IV.A.2.]

a. Within 60 days prior to the anniversary date of the financial assurance documents, or within 30 days after the firm's fiscal year for firms using the financial test or corporate guarantee, the facility's closure cost estimate shall be updated for inflation and submitted to the Executive Director. The adjustment shall be made by recalculating costs in current dollars, or by using an inflation factor derived from the most recent Implicit Price Deflator. Pursuant to 31 TAC 335.178, the cost estimate for closure shall be based on off-site disposal during closure of all waste and waste residue for all units not required to close as landfills.

b. If changes in the closure plan will increase the cost of closure, then the cost estimate shall be revised within 30 days after approval of the plan by the Executive Director. The revised cost shall also be adjusted as specified in Provision IV.A.2.a.

3. Facility closure shall commence:

a. Upon direction of the Texas Water Commission or the Executive Director for violation of the permit, TWC Rules, or State Statutes;

b. Upon suspension, cancellation, or revocation of the terms and conditions of this permit concerning the authorization to store, process, or dispose of waste materials;

c. Upon abandonment of the site;

d. Upon direction of the Executive Director for failure to secure and maintain an adequate bond or other financial assurance as required in Provision IV.A.1.; or

e. When necessary to comply with Provision VII.C.

4. The permittee shall submit a written request for a permit amendment or modification to authorize a change in operating plans, unit design, or the approved closure plan in accordance with the time frames of Provisions IV.A.5.a.-d. The written request shall include a copy of the amended closure plan for approval by the Executive Director. The permittee shall submit a written request for a permit amendment or modification to authorize a change in the approved closure plan whenever:

a. Changes in operating plans or facility design affect the approved closure plan;

[IV.A.4.]

b. There is a change in the expected year of final closure, if applicable;

c. In conducting partial or final closure activities, unexpected events require amendment of the approved closure plan; or

d. Requested by the Executive Director under the conditions described in Provisions IV.A.4.a.-c.

5. The permittee shall submit a written request for a permit amendment or modification:

a. At least 60 days prior to the proposed change in unit design or operation which will affect the approved closure plan;

b. No later than 60 days after an unexpected event has occurred which has affected the closure plan;

c. No later than 30 days after an unexpected event has occurred, if the unexpected event occurs during the partial or final closure period; or

d. Within 60 days of the Executive Director's request pursuant to Provision IV.A.4.d., or within 30 days if the change in facility conditions occurs during partial or final closure.

6. The permittee shall notify the Executive Director in writing at least 45 days prior to the date on which he expects to begin final closure of the facility. A copy of the notice shall be submitted to the Texas Water Commission (TWC) District 7 Office.

7. Within 60 days of the completion of final closure, the permittee shall submit to the Executive Director by registered mail, with a copy to the TWC District 7 Office, a certification that the hazardous waste management unit or facility, as applicable, has been closed in accordance with the specifications in the approved closure plan and the terms of this permit. The certification shall be signed by the permittee and by an independent registered professional engineer. Additional documentation supporting the independent registered professional engineer's certification shall be furnished to the Executive Director upon request until he releases the permittee from the financial assurance requirements for closure under 40 CFR 264.143(i).

[IV.]

B. Hazardous Waste Management Unit Closure Requirements:

1. All tanks, pumps, piping, and any other equipment or structures which have come in contact with waste shall either be decontaminated by removing all waste or disposed of at an authorized facility.

2. All wash water generated during decontamination activities shall be collected and disposed of in accordance with Provision III.B.4.

3. All hard-surfaced areas within the hazardous waste management unit areas shall be decontaminated and the wash water generated shall be collected and disposed of in accordance with Provision III.B.4.

4. Verification of decontamination shall be performed by analyzing wash water for the waste constituents which have been most recently in contact with the particular item being decontaminated.

V. Standard Permit Conditions

The permittee has a duty to comply with the Standard Permit Conditions under Title 31 TAC 305.125. Moreover, the permittee has a duty to comply with the following permit conditions:

A. In order to continue a permitted activity after the expiration date of the permit the permittee shall submit a new permit application at least 180 days before the expiration date of the effective permit, unless permission for a later date has been granted by the Executive Director. Authorization to continue such activity will terminate upon the effective denial of said application.

B. The permittee need not comply with the conditions of this permit to the extent and for the duration such noncompliance is authorized in an emergency order issued by the Commission.

C. For a new unit, the permittee shall not commence storage, processing or disposal of solid waste; and for a unit being modified, the permittee shall not process, store or dispose of solid waste in the modified portion of the unit, until the following requirements have been satisfied:

1. The permittee has notified the local TWC District Office and submitted to the Executive Director by certified mail or hand delivery a letter signed by the permittee and a Texas registered professional engineer certifying that the facility has been constructed or modified in compliance with the permit. Required certification shall be in the following form:

[V.C.1.]

This is to certify that the construction of the following facility components authorized or required by TWC Permit No. HW-50269 has been completed, and that construction of said facility component has been performed in accordance with and in compliance with the design and construction specifications of Permit No. HW-50269. (Description of facility units and components with reference to applicable permit provisions), and

2. The Executive Director has inspected the modified or newly constructed unit and finds it is in compliance with the conditions of the permit; or within 15 days of submitting the letter required by Provision V.C.1., the permittee has not received notice from the Executive Director of an intent to inspect, prior inspection is waived and the permittee may commence processing, storage or disposal of solid waste.

D. The following details shall be included as information which must be reported orally within 24 hours pursuant to Title 31 TAC 305.125(9):

1. Information concerning release of any solid waste that may cause an endangerment to public drinking water supplies.

2. Any information of a release or discharge of solid waste, or of a fire or explosion from a facility unit, which could threaten the environment or human health outside the facility. The description of the occurrence and its cause shall include the following information:

a. name, address, and telephone number of the owner or operator;

b. name, address, and telephone number of the facility;

c. date, time, and type of incident;

d. name and quantity of material(s) involved;

e. the extent of injuries, if any;

f. an assessment of actual or potential hazards to the environment and human health outside the facility, where this is applicable; and

g. estimated quantity and disposition of recovered material that resulted from the incident.

[V.]

E. The Executive Director may waive the five-day written notice requirement as specified in Title 31 TAC 305.125(9) in favor of a written report submitted to the Commission within 15 days of the time the permittee becomes aware of the noncompliance or condition.

F. An annual report must be submitted covering facility activities during the previous calendar year.

G. Emissions from this facility must not cause or contribute to a condition of "air pollution" as defined in Section 382.003 of the Texas Clean Air Act or violate Section 382.085 of the Texas Clean Air Act. If the Executive Director of the Texas Air Control Board determines that such condition or violation occurs, the permittee shall implement additional abatement measures as necessary to control or prevent the condition or violation.

H. The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

I. The permittee shall notify the Commission in writing within 10 days of discovery of any release to the environment of hazardous waste or hazardous constituents that may have occurred from any solid waste management unit at the facility regardless of when the release occurred or may have occurred, and regardless of when waste was placed in any unit. Release of hazardous waste or hazardous waste constituents from any solid waste management unit regardless of when waste was placed in that unit or when the release occurred, will constitute grounds for (1) a major permit amendment or modification pursuant to the Texas Solid Waste Disposal Act, TEXAS HEALTH AND SAFETY CODE, Chapter 361 (Vernon), as necessary to incorporate into the permit appropriate corrective action (2) the adoption by the Commission of a ground water compliance plan; or (3) other action deemed necessary by the Commission. Pursuant to such permit amendment or modification, ground-water compliance plan, or other order or action, the permittee shall then take timely corrective action for such releases.

Within forty-five (45) days of becoming aware of a solid waste management unit (SWMU) not previously addressed in the RCRA Facility Assessment, the permittee shall submit a preliminary assessment. The preliminary assessment shall include information regarding the SWMU to determine if there has been or is currently a release of hazardous waste or hazardous constituents from the unit. Based upon this information, the Executive Director may modify this permit as necessary.

[V.]

*If the release involves off-site contamination, the Director of the Hazardous Waste Division of Region VI of the U.S. Environmental Protection Agency must be included in all of the required activities specified in this provision.

J. Waste Minimization

The permittee shall certify annually by October 1 for the previous year ending August 31, that the permittee

1. has a program in place to reduce the volume and toxicity of all hazardous wastes which are generated by the permittee's facility operation to the degree determined to be economically practicable;

2. that the proposed method of treatment, storage, or disposal is that practicable method currently available to the permittee which minimizes the present and future threat to human health and the environment. The waste minimization certification is to be included in the operating records; and

3. has surveyed its plant processes and other sources of hazardous waste and has identified those that are listed on the TWC Annual Waste Summary. Within 210 days of the effective date of this permit, the permittee shall submit to the Executive Director a list of hazardous wastes generated, together with a list of Wastes Minimization Projects ("WMPs") that it has determined through its waste minimization review program can be implemented within the next five years.

   Annually thereafter, the permittee shall submit to the Executive Director, on or before the anniversary date of the permittee's first listing of WMPs, a report setting forth the following information:

   a. The status of each listed WMP as of the date of the report including the quantity of each hazardous waste and the percentage of reduction together with a projection concerning the expected work or resources that can be devoted to each listed WMP during the next twelve months;

   b. If any WMP has been deleted from the list previously submitted, the reason for such deletion; and

   c. A listing of any new of changed WMP that permittee's review program has developed since the last annual report.

[V.J.3.c.]

The Executive Director may require the permittee to submit a more detailed Status report for a specific WMP if it is unclear to the Executive Director the reasons the permittee has taken a particular action in regard to such WMP.

K. The permittee shall comply with 40 CFR 266.23(b).

L. The permittee is required to meet all performance standards in this permit, regardless of whether the permit also contains a specific design or other requirement relating to the performance standard.

* M. The permittee shall comply with the land disposal restrictions as found in 40 CFR 268 (Fed. Reg. November 7, 1986; June 4, 1987; July 8, 1987; August 17, 1988; June 23, 1989; June 1, 1990 and any subsequent applicable promulgations). Requirements include modifying the permittee's waste analysis plan, as necessary, to include analyses to determine compliance with applicable treatment standards or prohibition levels, pursuant to 40 CFR 268.7(c) and 264.13(a).

The following Provision V.N. is not a part of the TWC permit. It is included as part of the EPA permit, and is to be enforced only by EPA.

** N. The Permittee must comply with the requirements of 40 CFR 264 Subpart AA and Subpart BB, as applicable. Within 90 days of the effective date of this modification, the Permittee shall submit to the Director of the Hazardous waste Management Division, EPA, Region 6, a report which must contain, at the minimum, the following information:

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1. An equipment list which includes all of the information required under Part 264.1064 (b)(1) for equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight, and a list of all process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations managing hazardous waste with organic concentrations of at least 10 percent by weight.

2. For the process vents listed above, the amount of vent emissions in lb/hr or kg/hr, and in lb/yr or kg/yr.

3. If emissions in Provision V.N.2. of this section exceed the emission limits cited in Part 264.1032 (a)(1), the report must detail the manner in which compliance will be obtained, i.e., by the reduction of total organic emissions to the limits in Part 264.1032 (a)(1), or reduction by means of a control device per Part 264.1032 (a)(2).

[V.N.]

4. If a closed vent system and control device is installed to comply with the requirements in Part 264.1032 (a)(2), provide the following:

   a. An implementation schedule that includes dates by which the closed vent system and control device will be installed and in operation (Part 264.1033 (a)(2)).

   b. The type of control device under Part 264.1033 to be installed (e.g., vapor recovery, flare, etc...).

5. If the Permittee feels any of the requirements of Provision V.N., or of 40 CFR Part 264 Subparts AA and BB, are not applicable to this facility, the Permittee must provide justification for this decision as part of the report.

VI. Incorporated Regulatory Requirements

A. The following Texas Water Commission regulations are hereby made provisions and conditions of this permit. Issuance of this permit with incorporated rules in no way exempts the permittee from compliance with any other applicable state statute and/or Commission Rule.

1. 31 Texas Administrative Code (TAC) Chapter 335 Subchapter A:

2. 31 TAC Chapter 335 Subchapter B;

3. 31 TAC Chapter 335.152;

4. 31 TAC Chapters 335.153-335.155;

5. 31 TAC Chapters 335.177-335.179; and

6. 31 TAC Chapters 335.221-335.226.

B. To the extent applicable to the activities authorized by this permit, the following provisions of 40 Code of Federal Regulations Part 264, adopted by reference by 31 TAC Section 335.152, are hereby made provisions and conditions of this permit:

1. Subpart B -- General Facility Standards;

2. Subpart C -- Preparedness and Prevention;

3. Subpart D -- Contingency Plan and Emergency Procedures;

4. Subpart E -- Manifest System, Recordkeeping, and Reporting;

5. Subpart G -- Closure and Post-closure;

6. Subpart H -- Financial Requirements;

7. Subpart I -- Use and Management of Containers; and

8. Subpart J -- Tank Systems.

VII. Incorporated Application Materials

The permittee shall maintain the following documents at the facility and make them available for inspection by regulatory personnel.

A. Contingency Plan

The permittee shall follow the contingency plan, developed in accordance with 40 CFR Part 264, Subpart D, dated November 1, 1989, and revised July 1, 1989; August 10, 1989 and August 2, 1991, which is hereby approved subject to the terms of this permit and any other orders of the Texas Water Commission. The contingency plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of this permit upon the date of approval by the Commission.

B. Inspection Schedule

The permittee shall follow the inspection schedule, developed in accordance with 40 CFR 264.15, dated November 1, 1989, and revised July 1, 1989 and August 2, 1991, which is hereby approved subject to the terms of this permit and any other orders of the Texas Water Commission. The inspection schedule is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the schedule shall become provisions and conditions of this permit upon the date of approval by the Commission.

C. Closure Plan

Facility closure shall be completed in accordance with the requirements of 31 TAC Section 335.152 and 40 CFR Part 264 Subpart G and the closure plan dated November 1, 1989, and revised July 1, 1989; August 10, 1989 and August 2, 1991, which is hereby approved subject to the terms of this permit and any other orders of the Texas Water Commission. The closure plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of the permit upon the date of approval by the Commission.

[VII.]

D. Waste Analysis Plan

The permittee shall follow the waste analysis plan developed in accordance with 40 CFR 264.13, dated November 1, 1989, and revised July 1, 1989; August 10, 1989 and August 2, 1991, which is hereby approved subject to the terms of this permit and any other orders of the Texas Water Commission. The waste analysis plan is hereby incorporated into this permit by reference as if set out fully herein. Any and all revisions to the plan shall become provisions and conditions of this permit upon the date of approval by the Commission.

VIII. Standard Permit Conditions Applicable to Off-site Facilities

The following reports shall be submitted:

A. Manifest discrepancy report: If a significant discrepancy in a manifest is discovered, the permittee must attempt to reconcile the discrepancy. If not resolved within 15 days, the permittee must submit a letter report including a copy of the manifest to the Executive Director.

B. Unmanifested waste report: Must be submitted to the Executive Director within 15 days of receipt of unmanifested waste.

C. Monthly summary: A monthly summary must be submitted covering facility activities during the previous month, including product produced from waste and shipped.

IX. Standard Permit Conditions Applicable to Marketers of Hazardous Waste Fuel

A. Before engaging in the marketing of hazardous waste fuel, the permittee shall notify the U.S. Environmental Protection Agency (EPA) of hazardous waste fuel marketing activities.

B. A copy of the permittee's notice to EPA shall be maintained in the operating record for three years after all fuel marketing activities have been stopped.

C. Permittee shall not ship hazardous waste fuel without a written and signed notice from the recipient in the operating record that:

1. The burner or marketer has notified EPA and identified his waste-as-fuel activities; and

2. If the recipient is a burner, the burner will burn the hazardous waste fuel only in an industrial furnace or boiler identified in 31 TAC 335.222(b).

[IX.]

D. A copy of the notice from each recipient to the permittee shall be maintained in the operating record for three years after the last shipment to the recipient.

E. Dioxins, F020, F021, F023, F026, F027, and F028 shall not be blended into fuel.

F. Prior to selecting any waste stream for use in a fuel blend, a representative sample of the waste stream shall be collected and analyzed for heat content using ASTM D240 or D2015. The sample shall not be considered appropriate for fuel blending and the waste stream from which the sample was collected shall not be used in a fuel blend, unless the sample exhibits a total heat content of at least 5,000 BTU/lb. No waste stream with a total PCB content of 50 ppm or grater shall be used in a fuel blend.

G. Following final blending, i.e. before sale, a representative sample of the resultant hazardous waste mixture shall be collected and analyzed for heat content using ASTM D240 or D2015 and PCB content using SW846-8080. The resultant hazardous waste mixture shall not be labelled or otherwise represented as fuel unless the mixture exhibits the following criteria:

a. Total heat content of a least 8,000 BTU/lb; and

b. Total PCB content less than 50 ppm.

H. All sampling and analyses that are performed in order to ensure compliance with Provisions IX.F. and IX.G. above shall be maintained in the facility operating records.

X. This Section is not used.

XI. Air Quality Provisions

A. Issuance of this permit does not relieve the permittee from compliance with the Texas Clean Air Act (TCAA) as amended (TEXAS HEALTH AND SAFETY CODE, Chapter 382) or any applicable Rule, Regulation or Order of the Texas Air Control Board (TACB).

B. All representations with regard to construction plans and operating procedures in the permit application are conditions upon which this permit is issued. The permittee shall not vary from such representations if the change will result in a significant increase in the discharge of any air contaminant, unless prior notification is made to the Texas Water Commission (TWC). The TACB Central Office in Austin and the Harris County Pollution Control Department (HCPCD) shall be notified at the time of such notification to the TWC.

[XI.]

C. The appropriate regional office of the TACB and HCPCD shall be notified prior to the start of any governmentally required air monitoring of the facility units authorized by this permit in such a manner that a representative of the TACB and HCPCD may be present during monitoring.

D. The facility units covered by this permit shall not be operated unless all associated air pollution abatement equipment which is required to be in place is maintained in good working order and is operating properly during normal facility operations.

E. A copy of this permit shall be kept at the plant site and made available at the request of personnel from the TACB, TWC, or HCPCD.

F. The permittee shall maintain a duplicate record of a current inventory of materials regulated under this permit at an off-site location.

G. Containers of hazardous waste or solid waste shall be opened only for the purposes authorized by the terms and conditions of this permit.

H. The permittee shall install a carbon adsorption system which provides the following:

1. The carbon adsorption system shall at a minimum consist of a carbon absorber with the sampling point at its exit. The absorber exit shall be monitored on a weekly basis to determine breakthrough of organic compounds. If breakthrough is determined to have occurred as specified in Provisions XI.H.2.-3., the absorber shall be replaced by a second absorber or the absorber shall be regenerated immediately.

2. Breakthrough of organic compounds shall be determined by use of a photoionization detector equipped with lamps having an energy level of at least 11.7 eV or an equivalent detector.

3. Breakthrough shall be considered to have occurred when monitoring indicates a concentration of 100 ppm of total hydrocarbons present in the gas stream at the sampling point.

4. Disposal of spent carbon canisters shall not cause or create air emissions.

5. Engineering details and operating conditions of the final carbon bed design shall be provided to the HCPCD prior to use of the system.

I. Ducts, hoses, and connections in the tank truck liquid transfer systems shall be properly maintained to insure leak free conditions.

NAME: NSSI/Recovery Services, Inc.

[XI.]

J. Within 60 days of October 3, 1990, or sixty (60) days prior to use, whichever is later, the Permittee shall provide to HCPCD diagrams of the scrubber systems, including all manifolds, ductwork, and dampers.

K. All storage tanks in Building No. 2 containing volatile organic liquid shall be vented to the condenser carbon absorber system.

L. Storage tank and process vessels in Building No. 1 shall be vented to caustic scrubber prior to the condenser/carbon absorber system, unless there are no particulates or acid gases in the waste stream.

M. Vapors from tank trucks containing VOC shall be vented into the carbon absorber unit.

N. Vapors from tank trucks with acid liquids shall be vented to a caustic scrubber system.

O. The caustic scrubber shall meet the following criteria:

1. The caustic scrubber will be designed by the Permittee.

2. The scrubbing liquid to be used is no less than 0.1% caustic.

3. The minimum pH which will be maintained in each scrubber is 10.

4. The type of packing will be provided after the unit is designed.

P. The handling of hydrochlorlic-acid (25%) shall not exceed 10% of the total acid handled at this facility. Handling of hydrochloric acid (35%) shall not exceed 7.5% of the total acid handled at this facility.

Q. Sulfuric acids (98%) shall not exceed 13% of the total acid handled at this facility.

R. The maximum emission rates from the following sources are:

1. <u>The scrubber</u>
   (1) VOC: 2.9913 pounds per hour or one ton per year
   (2) Acid gases: 0.8452 pounds per hour or 0.17 ton per year

2. <u>The absorber</u>
   (1) VOC: 0.4759 pounds per hour or 0.25 ton per year
   (2) Acid gases: 0.2527 pounds per hour or 0.30 ton per year

XII. Monitoring of Commercial Hazardous Waste Management Facility Operations

A. Within the first year after commission action on the modification the facility owner or operator shall provide notice to affected persons of intent to have an independent annual environmental audit of the facility performed. The notice shall be issued in accordance with the following procedure.

1. The notice shall state the names of at least three independent inspectors nominated by the facility owner or operator to perform the environmental audit and shall be published in the newspaper of the largest general circulation that is published in the county in which the facility is located. The facility owner or operator shall not nominate an inspector who is employed or who has been employed by the facility.

2. The notice shall announce a meeting time and place, to be located near the facility location, be held within 15 days of the published notice in order for the facility to receive comments from and allow for participation by interested affected persons in the selection of the independent inspector. The interested affected persons may either agree to one of the nominated independent inspector or nominate other independent inspector if they do not approve of the nominee list. The selection of the independent inspector shall be agreed to by the facility owner or operator and the interested affected persons no later than 30 days from the date of the meeting. The name of the selected independent inspector shall be submitted to the commission no later than 15 days from the date of selection for the commission's approval. The commission shall approve the independent inspector after it has determined that the independent inspector has the necessary expertise to perform the audit and does not have a conflict of interest with any of the parties involved in the inspector selection.

3. The published notice may not be smaller than 96.8 square centimeters or 15 square inches with the shortest dimension at least 7.6 centimeters or three inches and shall contain at a minimum, the following information:

a. the facility owner's or operator's name;

b. the location of the facility;

c. the facility permit number;

d. the time and date of the scheduled annual environmental audit;

e. names of at least three nominated independent inspectors;

[XII.A.3.]

f. the date and time and location of the selection meeting; and

g. the name and telephone number of a facility contact person.

4. The facility owner or operator shall provide a copy of the published notice to local jurisdictions where the facility is located.

5. The facility owner or operator shall provide the commission with an affidavit including a newspaper tear sheet of the published notice and sworn statement of the editor or publisher certifying that the notice was given as required by this section. Acceptance of the affidavit creates a rebuttable presumption that the applicant has complied with this requirements.

B. If the facility owner or operator and interested affected persons cannot agree on the selection of an independent inspector within the time frame specified in Provision XII.A.2. the commission shall select an independent inspector. The commission's selection, however, shall not be limited to either the facility owner or operator's nominee list or the interested affected persons' nominee list. The commission shall take steps necessary to assure that the independent inspector or entity selected to perform the audit has the necessary expertise to perform the audit, is not a business competitor of the facility, and does not have a conflict of interest with any of the parties involved in the inspector selection.

C. The facility owner or operator shall pay the cost of notice required to be provided.

D. The facility owner operator shall be responsible for the costs of an independent annual environmental audit. The facility owner or operator shall also maintain responsibility for procuring the selected independent inspector. The commission shall not be a party to such procurement not warrant the workmanship of the selected inspector.

E. The facility owner or operator shall submit the results of an independent annual environmental audit in writing to the Executive Director.

F. The scope of the independent annual environmental audit may encompass any and all provisions of environmental permits required for the facility and all relevant statutes and regulations regarding the management of the facility.

G. The facility is not required to perform the annual independent environmental audit if the facility does not receive any comments from affected persons. If the facility performs the independent audit despite lack of response, the facility must obtain the commission's approval of the selected independent inspector prior to the audit.

[XII.]

H. An affected person is any person who is a resident of a county of any country adjacent or contiguous to the county in which a hazardous waste management facility is to be located including any person who is doing business or owns land in the county or adjacent or contiguous county and any local government. Such person affected shall also demonstrate to the commission that he has suffered or will suffer actual injury or economic damage.

Attachments

A -- Legal Description
B -- Site Plan