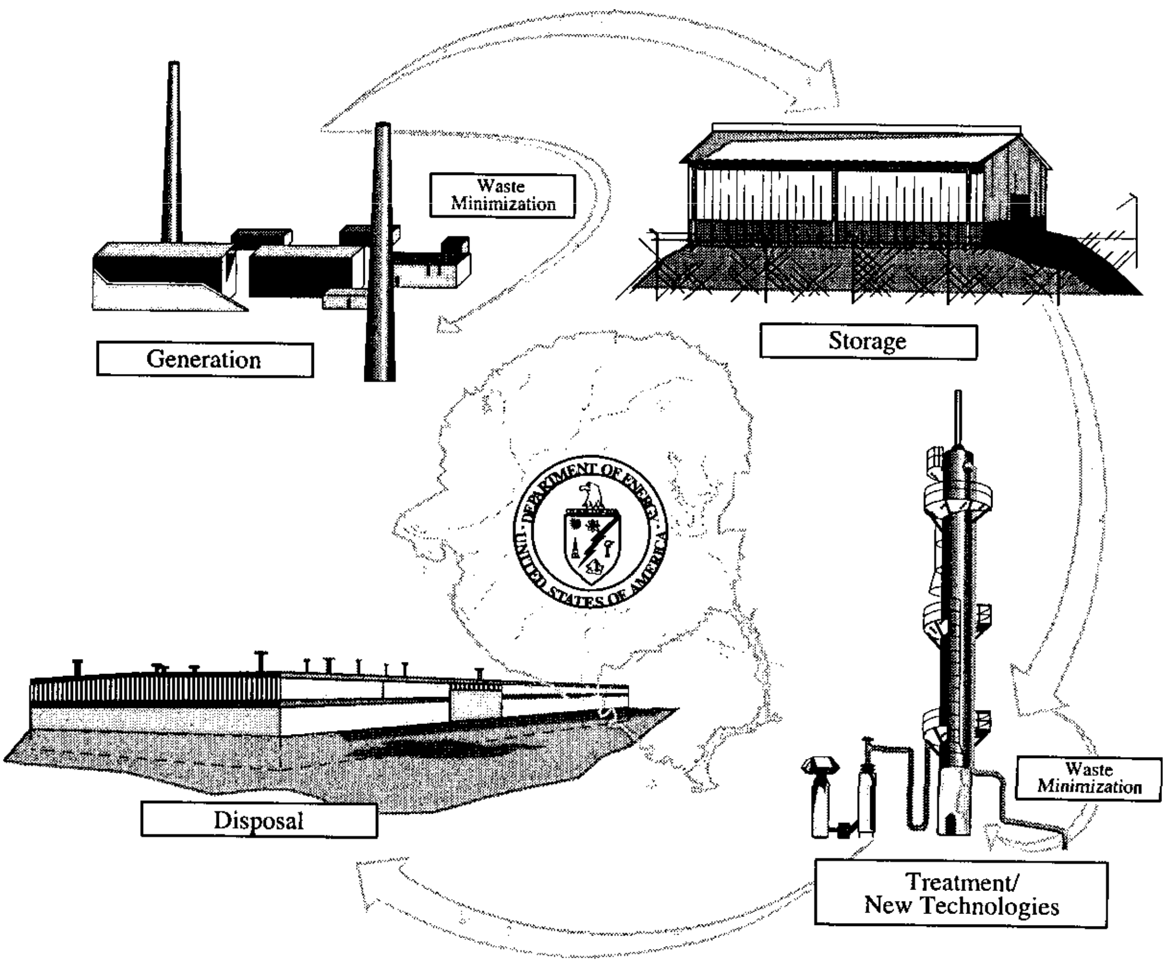
DOE/EIS-0217

Savannah River Site

Waste Management

Final
Environmental Impact Statement
Volume I



July 1995

Department of Energy • Savannah River Operations Office • Aiken, South Carolina

COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy (DOE)

TITLE: Final Environmental Impact Statement, Waste Management, Savannah River Site, Aiken, South Carolina (DOE/EIS-0217). TC

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ABSTRACT: The purpose of this environmental impact statement is to help DOE decide how to manage over the next 30 years liquid high-level radioactive, low-level radioactive, mixed, hazardous, and transuranic wastes generated during 40 years of past operations and on-going activities at Savannah River Site (SRS) in southwestern South Carolina. The wastes are currently stored at SRS. DOE seeks to dispose of the wastes in a cost-effective manner that protects human health and the environment. In this document, DOE assesses the cumulative environmental impacts of storing, treating, and disposing of the wastes, examines the impacts of alternatives, and identifies measures available to reduce adverse impacts. Evaluations of impacts on water quality, air quality, ecological systems, land use, geologic resources, cultural resources, socioeconomics, and the health and safety of onsite workers and the public are included in the assessment. TE TE TE

PUBLIC COMMENTS: In preparing this Final EIS, DOE considered comments received by letter and voice mail, and formal statements given at public hearings in Barnwell, South Carolina (February 21, 1995); Columbia, South Carolina (February 22, 1995); North Augusta, South Carolina (February 23, 1995); Savannah, Georgia (February 28, 1995); Beaufort, South Carolina (March 1, 1995); and Hilton Head, South Carolina (March 2, 1995). TC TC

FOREWORD

This environmental impact statement (EIS) evaluates alternative approaches to and environmental impacts of managing wastes at the Savannah River Site (SRS). The U.S. Department of Energy's (DOE's) primary mission at SRS from the 1950s until the end of the Cold War was to produce and process nuclear materials to support defense programs. These activities generated five types of waste: liquid high-level radioactive, low-level radioactive, hazardous, mixed (radioactive and hazardous combined), and transuranic wastes. These wastes are still being generated by ongoing operations, environmental restoration, and decontamination and decommissioning of surplus facilities. Because waste management alternatives would be implemented over several years, DOE may issue more than one Record of Decision based on this EIS. TE

Four waste management alternatives are evaluated in this EIS. In addition to the no-action alternative, which consists of continuing current management practices, this EIS examines one alternative for the limited treatment of waste, another for the extensive treatment of waste, and a third (the preferred alternative) that represents a moderate approach to waste treatment. The alternatives (except the no-action alternative) are analyzed based on three forecasts of the amounts of wastes that DOE could be required to manage over the next 30 years (1995 through 2024) at SRS. This EIS evaluates siting, construction, and start-up or operation of specific waste management facilities at SRS over the next 10 years, as well as operational impacts for the 30-year forecast horizon. Ten years was selected because that is approximately the time required to get a project approved, designed, and constructed. In addition, current treatment processes may be superseded by more effective processes as technology improves. Accordingly, it is not appropriate to select technologies now for treatment processes that will not be implemented in the next decade.

Assumptions and analyses in this EIS are generally consistent with those that are in or expected to be in the *Waste Management Programmatic EIS* (DOE/EIS-0200), the *Tritium Supply and Recycling Programmatic EIS* (DOE/EIS-0161), the *Stockpile Stewardship and Management Programmatic EIS* (DOE/EIS-0236), the *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs EIS* (DOE/EIS-0203), the *Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel EIS* (DOE/EIS-0218), the *Long-Term Storage and Disposition of Weapons-Useable Fissile Materials Programmatic EIS* (DOE/EIS-0229), the *Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment* (DOE/EA-0912), the *Interim Management of Nuclear Materials at SRS EIS* (DOE/EIS-0220D), the *F-Canyon Plutonium Solutions at SRS EIS* (DOE/EIS-0219), the *Defense Waste Processing Facility Supplemental EIS* (DOE/EIS-0082S), the TC TE

Operations of the HB-Line Facility and Frame Waste Recovery Process for Production of Pu-238 Oxide (DOE/EA-0948), the *Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components EIS* (DOE/EIS-0225), and the *SRS Proposed Site Treatment Plan* for mixed waste. TC TE

DOE published a Notice of Intent to prepare this EIS in the *Federal Register* on April 6, 1994 (59 FR 16494). The notice announced a public scoping period that ended on May 31, 1994, and solicited comments and suggestions on the scope of the EIS. DOE held scoping meetings during this period in Savannah, Georgia, and North Augusta and Columbia, South Carolina, on May 12, 17, and 19, 1994, respectively. During the scoping period, comments were received from individuals, organizations, and government agencies. Comments received during the scoping period and DOE's responses were used to prepare an implementation plan that defined the scope and approach of this EIS. The implementation plan was issued by DOE in June 1994. TE

TE Transcripts of public testimony received during the scoping process, copies of letters and comments, the implementation plan, and reference materials cited in this EIS are available for review in the DOE Public Reading Room, located at the University of South Carolina-Aiken Campus, Gregg-Graniteville Library, 2nd Floor, University Parkway, Aiken, South Carolina [(803) 648-6851], and the Freedom of Information Reading Room, Room IE-190, Forrestal Building, 1000 Independence Avenue, Washington, D.C. [(202) 586-6020].

DOE completed the draft of this EIS in January 1995, and on January 27, 1995, the U.S. Environmental Protection Agency (EPA) published a Notice of Availability of the document in the *Federal Register* (60 FR 5386). This notice officially started the public comment period on the draft EIS, which extended through March 31, 1995. Publication of the draft EIS provided an opportunity for public comment on the nature and substances of the analyses included in the document.

DOE has considered comments it received during the comment period in preparing this final EIS. These comments were received by letter, telephone, and formal statements made at public hearings held in Barnwell, South Carolina (February 21, 1995); Columbia, South Carolina (February 22, 1995); North Augusta, South Carolina (February 23, 1995); Savannah, Georgia (February 28, 1995); Beaufort, South Carolina (March 1, 1995); and Hilton Head, South Carolina (March 2, 1995). Comments and responses to comments are in Appendix I. TC

Changes from the draft EIS are indicated in this final EIS by vertical bars in the margin. The bars are marked TC for technical changes, TE for editorial changes, or, if the change was made in response to a public comment, the designated comment number as listed in Appendix I. Many of the technical changes were the result of the availability of updated information since publication of the draft EIS.

In May 1995, DOE announced its intention to revise the moderate treatment alternative to include supercompaction, size reduction (e.g., sorting, shredding, melting), and incineration at an offsite commercial treatment facility (60 FR 26417, May 17, 1995). The proposed change from the draft EIS concerned the location of, but not the technology used in the treatment of about 40 percent of the expected volume of low-level wastes at SRS. DOE provided an opportunity for public comment through June 12, 1995. No comments were received.

The proposed low-level waste volume reduction initiative is included in this final EIS, and as announced in the May 1995 *Federal Register* notice, it is subject to competitive procurement practices under procedures described in DOE's NEPA implementing regulations (10 CFR 1021.216). A Request for Proposals was sent to a selected group of 47 potential bidders on May 22, 1995 with a closing date of July 20, 1995. Work under any contract awarded would begin no earlier than the start of fiscal year 1996. TC

In June 1995, DOE published a draft of the *Environmental Assessment for the Off-Site Volume Reduction of Low-Level Radioactive Waste from the Savannah River Site* (DOE/EA-1061) for preapproval review by potentially affected states. The environmental assessment describes a proposed short-term temporary method of volume reduction for low-level waste by a commercial facility in Oak Ridge, Tennessee. This action would reduce the volume of low-level waste at SRS in an expedient and cost-effective manner over the near term (prior to the start of fiscal year of 1996). Because the impacts of the proposed action would be very small and the proposed action would not limit the selection of alternatives under consideration, this proposed volume reduction action qualifies as an interim action under the National Environmental Policy Act (NEPA) regulations (40 CFR 1506.1).

DOE prepared this EIS in accordance with the provisions of NEPA, Council on Environmental Quality regulations (40 CFR 1500-1508), and DOE NEPA Implementing Procedures (10 CFR 1021). This EIS identifies the methods used in the analyses and the sources of information. In addition, it incorporates, directly or by reference, information from other ongoing studies. The document is structured as follows: TE

Chapter 1 provides background information, sets forth the purpose and need for action, and describes related actions evaluated in other NEPA analyses. TE

TC Chapter 2 describes the alternatives, identifies the preferred alternative, and provides a summary comparison of the environmental impacts of each alternative.

TE Chapter 3 describes the environment at SRS potentially affected by the alternatives addressed.

TE Chapter 4 provides a detailed assessment of the potential environmental impacts of the alternatives. It also assesses unavoidable adverse impacts and irreversible or irretrievable commitments of resources, and cumulative impacts.

Chapter 5 identifies regulatory requirements and evaluates their applicability to the alternatives considered.

Appendix A provides waste forecasts (i.e., estimates of the expected, minimum, and maximum amounts of waste that could be managed over the 30-year analysis period at SRS).

Appendix B describes existing and proposed facilities that would be needed to implement the alternatives.

Appendix C describes the cost methodology and its application in estimating costs for facilities and processes to treat, store, and dispose of wastes.

Appendix D discusses emerging or innovative waste management technologies that were considered but rejected for use on SRS wastes. The technologies are in bench, pilot, or demonstration stages of development and are not likely to be available for implementation in the next decade, but might be suitable for implementation at some time during the 30-year period addressed in this EIS.

Appendix E furnishes a compilation of supplemental technical data used to prepare this EIS.

Appendix F describes accident scenarios related to the facilities that could be used to manage waste at SRS. It summarizes the potential consequences and risks to workers, the public, and the environment from the alternatives discussed in Chapter 2.

Appendix G is a compilation of the appendixes included in the Federal Facility Agreement and provides information on the commitments made by SRS to regulatory agencies to manage wastes and spills.

Appendix H compares DOE and Nuclear Regulatory Commission low-level waste requirements.

Appendix I contains copies of letters and hearing transcripts from the public comment period, and DOE's responses to those comments.

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Appendix J is a copy of the Protected Species Survey prepared in April 1995 in support of the draft EIS and agency confirmation that endangered species will not be impacted.

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SUMMARY

S.1 Introduction

The U.S. Department of Energy's (DOE's) primary mission at the Savannah River Site (SRS) from the
1950s until the end of the Cold War was to produce and process nuclear materials to support defense TE
programs. The end of the Cold War has led the United States to reduce the size of its nuclear arsenal.
Many of the more than 120 facilities across the country, including SRS, that DOE used to manufacture,
assemble, and maintain the former arsenal -- referred to as the nuclear weapons complex -- are no longer
needed for these activities and could be used for other purposes. Many of these facilities can be
decontaminated and converted to new uses; others must be decommissioned. In addition, the wastes TE
generated during the Cold War must be cleaned up in a safe and cost-effective manner. DOE must also
manage wastes that might be generated in the future by ongoing operations, including new defense
facilities that might be located at SRS. Finally, SRS must be brought into compliance with the TE
environmental requirements enacted during the last 25 years.

DOE prepared this environmental impact statement (EIS) on alternative strategies for managing wastes TE
at SRS (Figure S-1). This EIS evaluates the effects of managing liquid high-level radioactive, low-level
radioactive, hazardous, mixed (radioactive and hazardous), and transuranic wastes at SRS. It describes
alternatives that DOE could implement to manage these wastes [except alternatives for managing liquid
high-level radioactive waste, which were addressed in the recently issued *Final Supplemental* TE
Environmental Impact Statement, Defense Waste Processing Facility (DOE/EIS-0082S)]. It does not
consider sanitary wastes or foreign and domestic spent nuclear fuel. In addition, this EIS describes
studies that were performed to define and evaluate the alternatives.

Tables S-1 and S-2 present summary comparisons of the characteristics and impacts of the alternatives
considered. The tables include the no-action alternative, which would be to continue ongoing activities
and implement only activities that have already been evaluated under the National Environmental Policy
Act (NEPA), and three action alternatives. The action alternatives are based on strategies to provide
limited (alternative A), moderate (alternative B), and extensive (alternative C) treatment configurations,
all of which would protect human health and the environment, meet applicable storage and disposal TC
requirements, and use reasonable storage, treatment, and disposal technologies. This summary describes
the alternatives and the basis for DOE to identify the moderate treatment configuration alternative as its
preferred alternative.

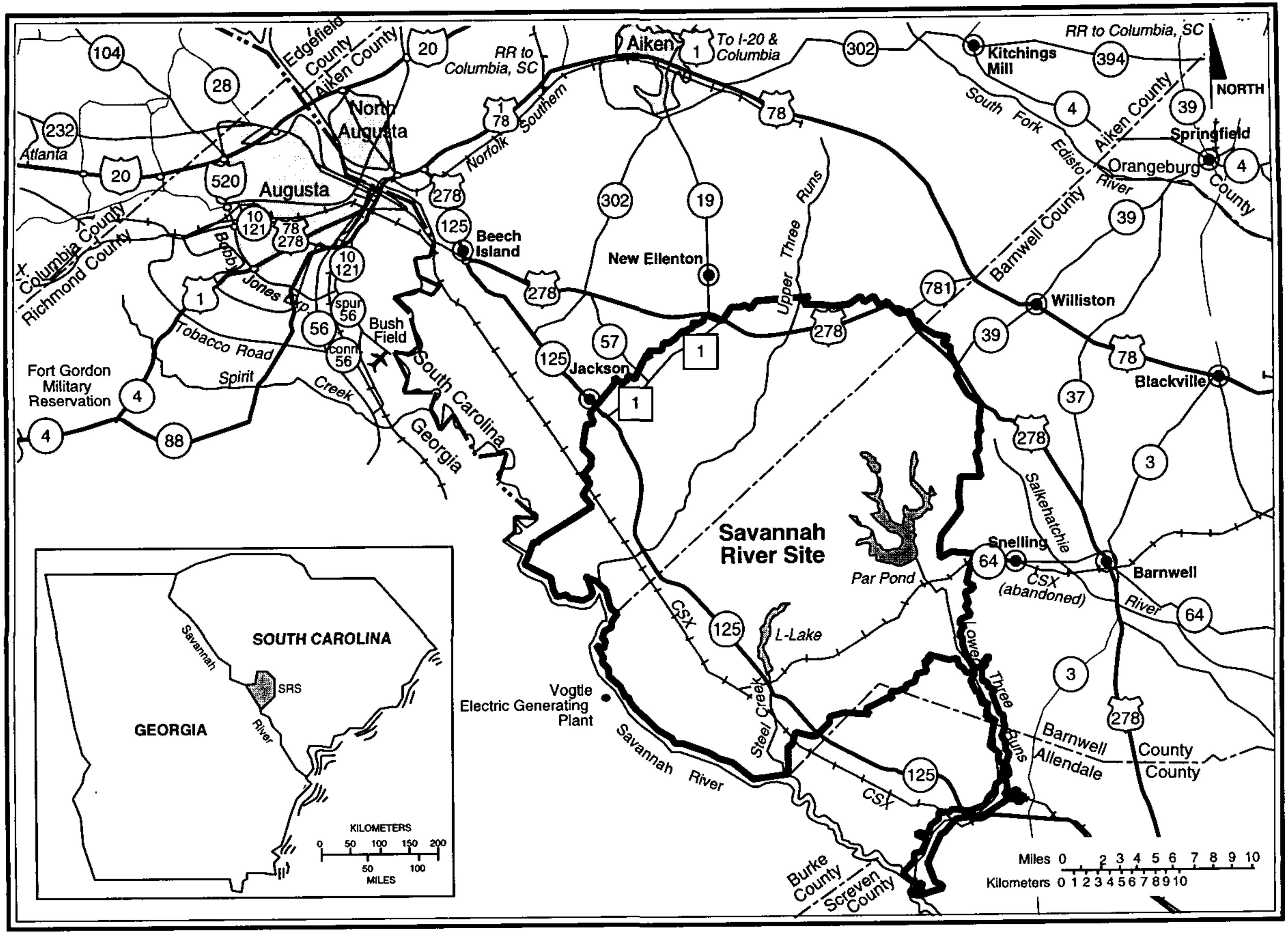

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Figure S-1. Savannah River Site.

This EIS provides information on the environmental impacts of the construction and operation of the specific treatment, storage, and disposal facilities proposed in each management alternative. The EIS is based on current waste inventories; present and anticipated sources of new wastes; and existing and anticipated waste management facilities. The evaluations in this EIS are intended to be consistent with those in or expected to appear in the *Waste Management Programmatic EIS* (DOE/EIS-0200), the *Tritium Supply and Recycling Programmatic EIS* (DOE/EIS-0161), the *Stockpile Stewardship and Management Programmatic EIS* (DOE/EIS-0236), the *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs EIS* (DOE/EIS-0203), the *Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel EIS* (DOE/EIS-0218), the *Long-Term Storage and Disposition of Weapons-Useable Fissile Materials Programmatic EIS* (DOE/EIS-0229), the *Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment* (DOE/EA-0912), the *Interim Management of Nuclear Materials at SRS EIS* (DOE/EIS-0220), the *F-Canyon Plutonium Solutions at SRS EIS* (DOE/EIS-0219), the *Defense Waste Processing Facility Supplemental EIS* (DOE/EIS-0082S), the *Operations of the HB-Line Facility and Frame Waste Recovery Process for Production of Pu-238 Oxide* (DOE/EA-0948), the *Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components EIS* (DOE/EIS-0225), and the *SRS Proposed Site Treatment Plan* for mixed waste. DOE will use these evaluations to make decisions on waste management. Because management alternatives would be implemented over the next decade, DOE may issue more than one Record of Decision following completion of this EIS.

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In preparing this EIS, DOE considered the comments it received from organizations and individuals during the scoping process that extended from April 6 through May 31, 1994. The scoping process and plans for preparing this EIS were described in the *Implementation Plan Savannah River Site Waste Management Environmental Impact Statement*, which DOE issued in June 1994. DOE also considered comments it received on the draft EIS issued in January 1995 during a public comment period that extended from January 27, 1995, to March 31, 1995.

In May 1995, DOE announced its intention to revise the moderate treatment alternative to include supercompaction, size reduction (e.g., sorting, shredding, melting), and incineration at an offsite commercial treatment facility (60 FR 26417, May 17, 1995). The proposed change from the draft EIS concerned the location of, but not the technology used in the treatment of about 40 percent of the expected volume of low-level wastes at SRS. DOE provided an opportunity for public comment through June 12, 1995. No comments were received.

TC

In June 1995, DOE published a draft of the *Environmental Assessment for the Off-Site Volume Reduction of Low-Level Radioactive Waste from the Savannah River Site* (DOE/EA-1061) for preapproval review by potentially affected states. The environmental assessment describes a proposed short-term temporary method of volume reduction for low-level waste by a commercial facility in Oak Ridge, Tennessee. This action would reduce the volume of low-level waste at SRS in an expedient and cost-effective manner over the near term (prior to the start of fiscal year of 1996). Because the impacts of the proposed action would be very small and the proposed action would not limit the selection of alternatives under consideration, this proposed volume reduction action qualifies as an interim action under NEPA regulations (40 CFR 1506.1).

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DOE has identified the moderate treatment configuration, alternative B, as its preferred alternative based on the careful consideration of beneficial and adverse environmental impacts, regulatory commitments, and other relevant factors. The moderate treatment configuration would provide a balanced mix of technologies that includes extensive treatment of those waste types that have the greatest potential to adversely affect humans or the environment because of their mobility or toxicity if left untreated (such as wastes containing plutonium-238), or that would remain dangerously radioactive far into the future (such as wastes containing transuranics). It would provide less extensive treatment of wastes that do not pose great threats to humans or the environment, or that will not remain dangerously radioactive far into the future (such as non-alpha low-level waste).

DOE bases its preference of alternative B on the following environmental impacts, regulatory commitments, and other factors:

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- Mixed waste technology selections are compatible with the site treatment plan. When a waste in the EIS 30-year forecast was also included in the site treatment plan 5-year forecast, alternative B uses the same technology as that identified as the preferred treatment by the proposed site treatment plan.

- Mixed waste technology selections are consistent with DOE's commitments under the Land Disposal Restrictions Federal Facility Compliance Agreement with EPA.

- Transuranic waste technology selections are compatible with what the final Waste Isolation Pilot Plant waste acceptance criteria are expected to require. Treatment is provided only for those transuranic wastes that do not conform to the shipping requirements (i.e., plutonium-238 and higher activity plutonium-239). All other SRS transuranic wastes are expected to meet the Waste Isolation Pilot Plant waste acceptance criteria after repackaging and characterization/certification.

- Hazardous wastes are treated onsite subject to availability of treatment capacity and compatibility with technologies required to manage mixed waste.

- Alternative B provides the best volume reduction for low-activity waste (75 percent reduction in alternative B compared to 22 percent for alternative A and 70 percent for alternative C), conserves space in low-activity waste vaults, reduces the total number of low-activity waste vaults, and thus avoids expenditures of land and money.

- Alternative B also results in the fewest number of additional transuranic and alpha waste pads, shallow land disposal trenches, and RCRA-permitted vaults.

- Alternative B results in the least construction-related air emissions. TC

- Alternative B employs less thermal treatment (technologies generally resulting in higher air emissions) than alternative C, resulting in smaller radiological air impacts than would occur in alternative C (e.g., fewer involved worker latent cancer fatalities and lower maximally exposed offsite individual fatal cancer probability).

In summary, DOE believes that alternative B provides the preferred configuration of treatment, storage, and disposal facilities for SRS. It maintains technology selection flexibilities that are not shared by alternatives based on strategies to provide limited (alternative A) or extensive (alternative C) treatment configurations.

Different wastes and volumes are proposed for treatment in the Consolidated Incineration Facility under alternatives A, B, and C. Under the no-action alternative, the Consolidated Incineration Facility would not operate and the wastes that could have been treated in it would be stored, sent offsite for treatment, or compacted and then disposed of in vaults. In the limited-treatment configuration (alternative A), the Consolidated Incineration Facility would burn certain mixed wastes (including mixed waste identified in the site treatment plan) and hazardous wastes for which incineration is the best demonstrated available or EPA-specified technology. In the moderate-treatment configuration (alternative B) the Consolidated Incineration Facility would burn some low-level radioactive wastes in addition to the mixed and hazardous wastes proposed in alternative A. In the extensive-treatment configuration (alternative C), the Consolidated Incineration Facility would burn the same wastes proposed in alternative B and a portion of the alpha waste, but only for approximately 10 years. After that period, two vitrification facilities would treat those wastes, and the Consolidated Incineration Facility would no longer operate.

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This EIS was prepared in accordance with the National Environmental Policy Act of 1969, which requires Federal agencies to prepare a detailed statement on the environmental impacts of the proposed action and alternatives to the proposed action for "major Federal actions significantly affecting the quality of the human environment." DOE's policy is to follow the letter and spirit of NEPA and to comply fully with the Council on Environmental Quality's *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 CFR 1500-1508) (DOE regulations at 10 CFR 1021, National Environmental Policy Act Implementing Procedures).

S.2 Background

TE DOE's primary mission at SRS from the 1950s until the end of the Cold War was to produce and process nuclear materials to support defense programs in the United States. These activities resulted in the generation of the five types of waste discussed in this EIS. SRS's present mission focuses on waste management, environmental restoration, and decontamination and decommissioning of facilities that are no longer needed to produce and process nuclear materials.

DOE is responding to several needs and issues in proposing a waste management strategy for SRS and preparing this EIS. In addition to the examination of alternative strategies for waste management at SRS, this EIS presents the results of other analyses of waste management.

The Federal Facility Compliance Act of 1992, an amendment to the Resource Conservation and Recovery Act (RCRA) (Public Law 102-386, October 6, 1992), requires DOE to prepare a site treatment plan for SRS that sets forth options for treating mixed wastes currently in storage or that will be generated over the next 5 years. This EIS analyzes the environmental impacts of the facilities that could TE be used to treat mixed wastes according to the options presented in SRS's plan; the DOE *Waste Management Programmatic EIS* also examines the possible impacts of treating mixed wastes at SRS and elsewhere. The alternatives evaluated here and others are consistent with the options presented in the site treatment plan. However, the plan is limited to options for treating mixed wastes currently in storage or generated during the next 5 years. This EIS evaluates alternatives for managing mixed and other types TE of wastes using existing and new facilities that would be available during the next 10 years. This EIS also establishes a baseline for assessing options for waste management for the period beyond that of the site treatment plan. For example, this EIS examines options for storing, treating, and disposing of low-TE level radioactive and hazardous wastes that are not mixed waste and which, therefore, are not addressed in the site treatment plan.

On October 22, 1993, DOE stated that it would prepare this EIS on waste management strategies for SRS and identified some of the elements that would be evaluated. DOE committed to evaluate in this EIS TE both the facilities that might be used to treat mixed wastes, as required by the Federal Facility Compliance Act of 1992, and the operation of the Consolidated Incineration Facility. (DOE prepared an environmental assessment [DOE/EA-0400] and issued a Finding of No Significant Impact [*Federal Register,* December 24, 1992] on the Consolidated Incineration Facility, which is currently under TC construction.) The proposed treatments of mixed waste would be taken into account in formulating the alternatives for this EIS. DOE stated that it would evaluate the Consolidated Incineration Facility and other alternatives (e.g., compaction) for reducing the volume of low-level waste. The cost analysis of potential alternatives would be based on life-cycle costs (i.e., construction, operation, and decommissioning) of facilities so that the costs of the Consolidated Incineration Facility would be calculated on a consistent basis for comparison to the facilities for which detailed facility designs have not been developed. The incinerator's construction would continue on schedule, but trial burns would be TC deferred until this EIS is completed and DOE decides on how or whether to use the Consolidated Incineration Facility.

This EIS is intended to meet DOE's commitments to the public to re-examine the environmental impacts TE of operating the Consolidated Incineration Facility; it also provides a basis for future DOE decisions on operation of that facility.

This EIS incorporates the preferred options proposed in the *SRS Proposed Site Treatment Plan* for mixed TC wastes and evaluates the environmental impacts that may result from management activities for liquid high-level radioactive, low-level radioactive, hazardous, mixed, and transuranic wastes at SRS over the next 30 years. This EIS includes an assessment of the cumulative impacts of waste management and other past, ongoing, and reasonably foreseeable activities at SRS in Section 4.15. TE

S.3 Purpose and Need for Agency Action

Many of the more than 120 facilities across the country that DOE used to manufacture, assemble, and TE maintain its nuclear arsenal – referred to as the nuclear weapons complex – are no longer needed for these activities and could be used for other purposes. In addition, the wastes generated during the Cold War must be cleaned up in a safe and cost-effective manner. Furthermore, SRS facilities must be TC brought into compliance with the many environmental requirements enacted since 1970.

In order to convert a number of facilities to other uses and clean-up the Cold War's legacy at SRS, DOE needs to develop a strategy for managing existing and future wastes. The purpose of the alternatives TE evaluated in this EIS is to ensure the protection of human health and the environment, and to achieve and maintain regulatory compliance in a cost-effective manner. This EIS evaluates the potential environmental impacts of alternative strategies for minimizing, treating, storing, and disposing of radioactive and hazardous wastes at SRS.

To evaluate strategies for managing wastes, DOE must predict the amount of waste it will manage at SRS from operations, decontamination and decommissioning, and environmental restoration. Although the defense mission at SRS has been reduced, continuing and new operations will generate some wastes. In some cases, the amounts of wastes that will be generated can only be estimated approximately because final decisions about some operations have not been made. For example, processing high-level waste into borosilicate glass, as described in the *Final Supplemental Environmental Impact Statement, Defense Waste Processing Facility*, and the interim management of nuclear materials would generate secondary wastes. Estimates of these wastes have been included in the waste forecasts.

It is also difficult to predict the amounts of wastes requiring management because DOE does not know the extent of decontamination and decommissioning or environmental restoration that will take place at SRS. At present, DOE cannot identify all of the facilities that will become surplus or predict when a particular facility will no longer be needed to maintain the nuclear arsenal. Thus, DOE does not have a complete schedule of the facilities it will eventually decontaminate and decommission. In addition, DOE cannot identify at this time all of the contaminated areas at SRS that will require restoration. As a result of these uncertainties about the amounts of wastes that will be generated, DOE has estimated a range of waste quantities it could generate at SRS during the restoration of contaminated areas and the decontamination and decommissioning of surplus facilities. The maximum and minimum forecasts of the wastes generated by restoration and decontamination and decommissioning were used in the analyses presented in this EIS.

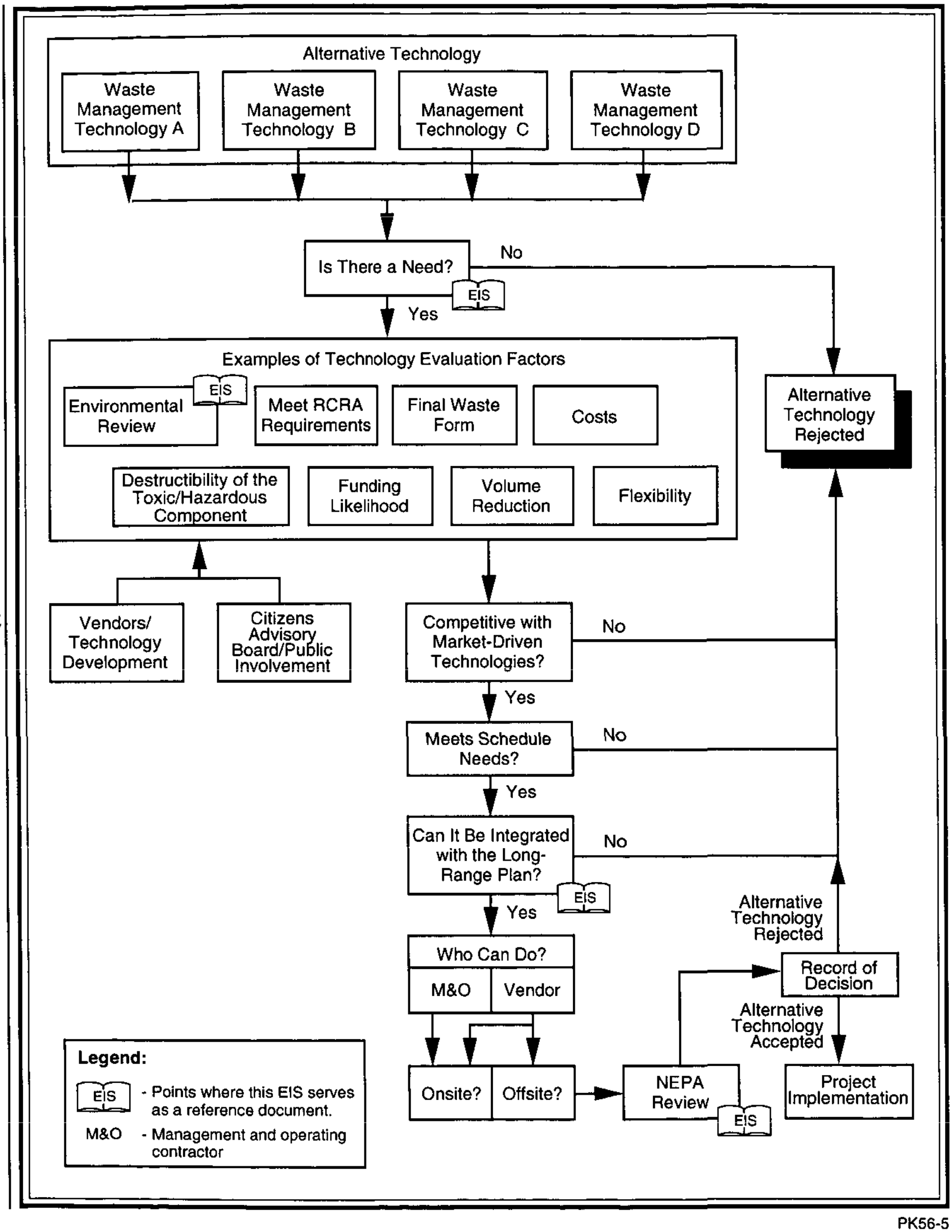
In addition to wastes that have been or will be generated at SRS, SRS may receive and manage wastes from other DOE facilities. Estimating the amounts of wastes to be received from other facilities is even more difficult than predicting the amounts of wastes that will be generated at SRS. The amounts of offsite waste sent to SRS will depend on activities at other DOE facilities involving ongoing operations, waste management, environmental restoration, and decommissioning. These activities in turn depend on NEPA reviews DOE is conducting on: (1) the future needs of the nuclear weapons complex; (2) the possible consolidation of nuclear materials and wastes at certain facilities; and (3) the locations of treatment, storage, and disposal facilities in the DOE complex. For purposes of this EIS, DOE has assumed that the wastes SRS will receive from other sites will fall somewhere between the amounts it now receives (included in the expected forecast) and a maximum estimate which includes all wastes that have been identified to date as possible candidates for treatment, storage, or disposal at SRS (included in the maximum forecast).

S.4 Proposed Action

DOE needs to develop a strategy to manage radioactive and hazardous wastes at SRS now and in the future. DOE proposes to select and implement a waste management strategy for SRS that protects human health, complies with environmental regulations, minimizes waste generation, utilizes effective and commercially available technologies for near-term management needs, and is cost effective. There are numerous technologies available to treat wastes like those generated and stored at SRS. DOE conducted a thorough evaluation to determine the best available technologies for specific SRS wastes. The abilities of emerging technologies to decontaminate, reduce the volume of, or stabilize SRS wastes were evaluated against three general criteria: their ability to treat SRS wastes and meet regulatory requirements; their safety and environmental risks; and their cost compared to competitive technologies. The technology evaluation process is illustrated in Figure S-2. Figure S-2 is a general representation of the process by which specific technologies may be selected over time as new technologies become available or as waste management issues become apparent. It is not intended to illustrate the structure of this EIS (references in the figure to this EIS are intended to show where this document serves as a useful planning baseline). Candidate technologies selected for evaluation include waste minimization, compaction, incineration, vitrification, macroencapsulation, and containment. Facilities that use these technologies and were selected as part of one or more of the action alternatives include: TC

- Consolidated Incineration Facility
- Transuranic waste characterization/certification facility
- Containment building for the treatment of hazardous and mixed wastes
- Alpha and non-alpha vitrification facilities
- Offsite supercompactor
- Soil sort facility

Other management facilities and treatments evaluated in the alternatives are listed in Table S-1. The strategy DOE selects must address minimization, treatment, storage, and disposal of low-level radioactive, hazardous, mixed, and transuranic wastes at SRS. This EIS evaluates the environmental impacts of three potential action alternatives, in addition to the no-action alternative required by NEPA. TE



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TE **Figure S-2.** Process for evaluating waste management technologies.

S.5 Alternatives

In this EIS, the no-action alternative is defined as the continuation of current management practices and includes building additional facilities to store newly generated waste, as has been done in the past. The no-action alternative is presented first because its implementation would continue current practices for treatment and storage of liquid high-level radioactive (including operation of the Defense Waste Processing Facility), mixed, and transuranic waste; disposal of low-level radioactive waste; and offsite treatment and disposal of hazardous waste.

The no-action alternative would not meet the need for DOE action. It would leave transuranic and mixed wastes untreated, in storage, and in forms not suitable for disposal. It could also cause DOE to violate some regulatory requirements and agreements. The no-action alternative provides a baseline against which the environmental impacts of the action alternatives can be compared. Because it is a baseline and represents a continuation of current practices, its impacts were evaluated using the expected 30-year waste forecast.

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Under the no-action alternative, additional storage and disposal facilities would be constructed (shown in Table S-1) and some treatment facilities currently under construction and planned facilities already evaluated under NEPA would be completed and, with the exception of the Consolidated Incineration Facility, operated. Planned facilities that would operate under the no-action alternative as well as in the three action alternatives include:

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- E-Area vaults for the disposal of low-level wastes
- Hazardous Waste/Mixed Waste Disposal Vaults
- M-Area Vendor Treatment Facility
- Long-Lived Waste Storage Building
- Replacement High-Level Waste Evaporator
- New Waste Transfer Facility

DOE would continue to implement pollution prevention and waste minimization activities, and would continue to prepare high-level wastes for vitrification in the Defense Waste Processing Facility, as described in the recently issued *Final Supplemental Environmental Impact Statement, Defense Waste Processing Facility*. DOE would continue to compact low-level waste where appropriate, and dispose of it by shallow land disposal or in vaults, depending on waste characteristics; DOE would store long-lived wastes in a long-lived-waste storage building. Hazardous wastes would continue to be recycled for onsite use or sent offsite for treatment and disposal. Storage of mixed wastes would continue in storage

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buildings and tanks onsite; DOE would vitrify limited quantities of mixed waste onsite and would store the treatment residues pending disposal in vaults; DOE would begin to ship radioactive polychlorinated biphenyls (PCBs) offsite for processing and return the residues to SRS for shallow land disposal. Transuranic and alpha wastes would continue to be stored on transuranic waste storage pads, the existing Experimental Transuranic Waste Assay Facility/Waste Certification Facility would assay and X-ray drums of transuranic and alpha waste to verify packaging and content, and newly-generated alpha waste would be disposed of in vaults. SRS would continue to receive low-level waste from the Naval Reactors Program.

This EIS evaluates three action alternatives that would meet DOE's need to manage wastes in a safe and cost-effective manner. Five criteria were employed to identify the most desirable technologies: process parameters (including degree of volume reduction, secondary waste generated, and the efficiency of process decontamination and decommissioning); engineering parameters (including process maturity, availability, and ease of maintenance); environment, health, and safety factors (public and occupational risks, environmental risks, and transportation requirements); public acceptance (including regulatory permitting and schedule considerations); and cost. Although the five criteria were applied in all three alternatives, the value of each parameter was weighted differently among the alternatives. Alternatives A and C have one or more parameters skewed toward one extreme or another, while alternative B, the preferred alternative, attempts to balance the parameters. The following paragraphs briefly summarize these alternatives:

- **Limited Treatment Configuration (Alternative A).** This alternative consists of siting, constructing, and operating facilities (shown in Table S-1) and implementing management techniques that would minimize impacts from treatment processes while complying with existing regulations. For each of the wastes, the treatment provided would be the minimum needed to meet applicable standards and allow prompt storage and disposal. This would minimize both worker exposure from handling and processing wastes, and public exposure to effluents or emissions generated by treatment processes. The limited treatment processes under this alternative would produce a safe waste form, but not one that had undergone the most vigorous treatment available, so the volumes of wastes would be greater and the potential for impacts in the future from storage and disposal would be more likely than under the other action alternatives.

  Under this alternative, low-level waste would only be treated by existing compactors at SRS, as appropriate, before storage in buildings or on storage pads or before disposal by shallow land disposal or in vaults. Hazardous wastes would be recycled, sent offsite for treatment and disposal, or together with appropriate mixed wastes, treated in the Consolidated Incineration Facility with the resulting stabilized ash and blowdown residues disposed of in RCRA-permitted disposal facilities or shallow land disposal. Other mixed wastes would be treated to permit reuse, or sent offsite for treatment and the residue returned to SRS for disposal. Transuranic waste meeting waste acceptance criteria for the Waste Isolation Pilot Plant would be repackaged and stored on storage pads pending shipment to that site for disposal, and alpha wastes would be disposed of in onsite vaults.

- **Moderate Treatment Configuration (Alternative B).** The preferred alternative consists of siting, constructing, and operating facilities (shown in Table S-1) and implementing management techniques that would provide a mix of cost-effective waste management and treatment technologies selected to balance short- and long-term impacts. TC

Under this alternative, the volume of compatible low-level wastes would be reduced by onsite compactors and sent offsite for supercompaction, size reduction (e.g., sorting, shredding, melting), and incineration as part of the low-level waste offsite volume reduction initiative. The proposed offsite volume reduction initiative in this alternative was announced and public comments were solicited in the *Federal Register* on May 17, 1995 (60 FR 26417); it represents a change from the draft to the final EIS. TC Other low-level wastes would be disposed of without treatment, treated offsite for recycling or later disposal at SRS, or burned in the Consolidated Incineration Facility together with mixed and hazardous wastes. The resulting treatment residues would be disposed of in vaults or by shallow land disposal. Mixed soil and sludge wastes would be treated in a non-alpha vitrification facility (after 2006); other mixed wastes would be processed onsite or offsite for recycling or disposal. Hazardous wastes would generally be treated and disposed of offsite, or treated onsite for reuse or disposal. Transuranic wastes would be stored until 2008, when a transuranic waste characterization/certification facility and an alpha vitrification facility became available; these facilities would produce transuranic waste forms acceptable for transfer to the Waste Isolation Pilot Plant, and alpha waste forms acceptable for disposal in onsite disposal facilities.

The moderate treatment configuration would provide extensive treatment for those wastes that have the greatest potential to adversely affect humans or the environment and limited treatment for those wastes for which more extensive treatment would not appreciably decrease the associated impacts. This alternative draws on both the more extensive treatments proposed under alternative C and the limited treatments proposed under alternative A. TC For example, under alternative A, all transuranic wastes would be repackaged in accordance with the acceptance criteria for the Waste Isolation Pilot Plant while under alternative C all transuranic wastes would

TC be vitrified. Under alternative B, DOE proposes that only plutonium-238 and the high-activity portions of the plutonium-239 transuranic wastes be vitrified and the remainder of the plutonium-239 wastes be repackaged.

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- **Extensive Treatment Configuration (Alternative C).** This alternative consists of siting, constructing, and operating facilities (shown in Table S-1) and implementing management techniques that would minimize environmental impacts from storage and disposal by extensive treatment of wastes to reduce their volume and toxicity and to create stable, migration-resistant waste forms. This alternative would, however, be more likely than other alternatives to increase short-term impacts because more treatment facilities would be built and there would be more exposure to radiological emissions from more intensive treatment and increased handling.

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TC Under this alternative, DOE would incinerate low-activity and tritiated low-level waste in the Consolidated Incineration Facility until 2006, when a non-alpha vitrification facility would begin operating. DOE would store or compact onsite, other low-level waste, or treat it offsite for recycling or later disposal at SRS. DOE would burn mixed waste in the Consolidated Incineration Facility, as appropriate, until a non-alpha vitrification facility became available, or otherwise treat it onsite (offsite for PCBs and lead) to allow reuse or disposal. Hazardous wastes would also be burned in the Consolidated Incineration Facility until a non-alpha vitrification facility became available, or otherwise treated onsite (offsite for PCBs) for reuse or disposal. Transuranic wastes would be characterized and repackaged according to their alpha radioactivity, converted into glass in an alpha vitrification facility, and stored pending disposal at the Waste Isolation Pilot Plant. DOE would burn alpha waste in the Consolidated Incineration Facility until 2006; after 2006, DOE would vitrify it, and dispose of it by shallow land disposal or in low-level waste or RCRA-permitted vaults.

TC DOE evaluated a wide variety of operational scenarios for the Consolidated Incineration Facility, from no operation to treatment of hazardous, mixed, low-level radioactive, and alpha wastes. DOE believes that the Consolidated Incineration Facility could play a vital role in an integrated waste management configuration for SRS. DOE also evaluated alternative configurations for reducing the volume of low-level waste. Application of compaction varies from operating the existing SRS compactors to sending low-level waste to a supercompactor at another location. DOE believes that both compaction and incineration are viable components of an integrated waste management configuration.

Three forecasts of waste volumes were developed for each alternative based on the expected, minimum, and maximum amounts of wastes SRS might need to manage. Because the no-action alternative does not satisfy the need for action, DOE evaluated the no-action alternative only with the expected waste forecast. The intent of the minimum and maximum forecasts was to identify how waste management activities might change with changes in the amounts of waste, and to identify the differing impacts of the waste management activities. Under all alternatives, liquid high-level wastes would be managed as described in the no-action alternative, although the volumes to be managed would vary between the three waste forecasts. TE

S.6 Affected Environment

SRS encompasses approximately 800 square kilometers (300 square miles) within the Atlantic Coastal Plain and includes portions of Aiken, Allendale, and Barnwell Counties in South Carolina. Four population centers — Augusta, Georgia; and Aiken, Barnwell, and North Augusta, South Carolina — are within 40 kilometers (25 miles) of SRS. Three small South Carolina towns — Jackson, New Ellenton, and Snelling — are immediately adjacent to the SRS boundary on the northwest, north, and east, respectively (Figure S-1). Approximately 69 percent of the SRS land is upland forest, approximately 22 percent is water and wetlands, and about 9 percent is developed. Land within E-Area (the proposed location of most of the waste management facilities; see Figure S-3) is classified as developed land. Table S-2 presents the acreages required for the additional facilities proposed for the alternatives.

S.7 Environmental Consequences

This section summarizes the potential environmental impacts of waste management activities, including the construction and operation of new facilities. This EIS examines impacts to natural resources such as air, water, and plants and animals, and to human resources, such as the health of workers and the public, and the social and economic structure of nearby communities. For many parameters, existing environmental conditions are not expected to change. TE

The evaluation of the environmental impacts of the alternatives considered in this EIS, which bound both the full range of reasonable waste management strategies and the quantities of waste that might be TE managed at SRS, indicates that many impacts would be very small. Furthermore, the differences in impacts among management alternatives are small for the same waste forecast. The major determinant of potential impacts is the amount of waste SRS would be called on to manage. In other words, differences in waste forecasts are more significant than differences in management strategies with regard to potential environmental impacts. The amount of waste SRS will manage depends largely on the extent TE of environmental restoration and facility decontamination and decommissioning undertaken at SRS in

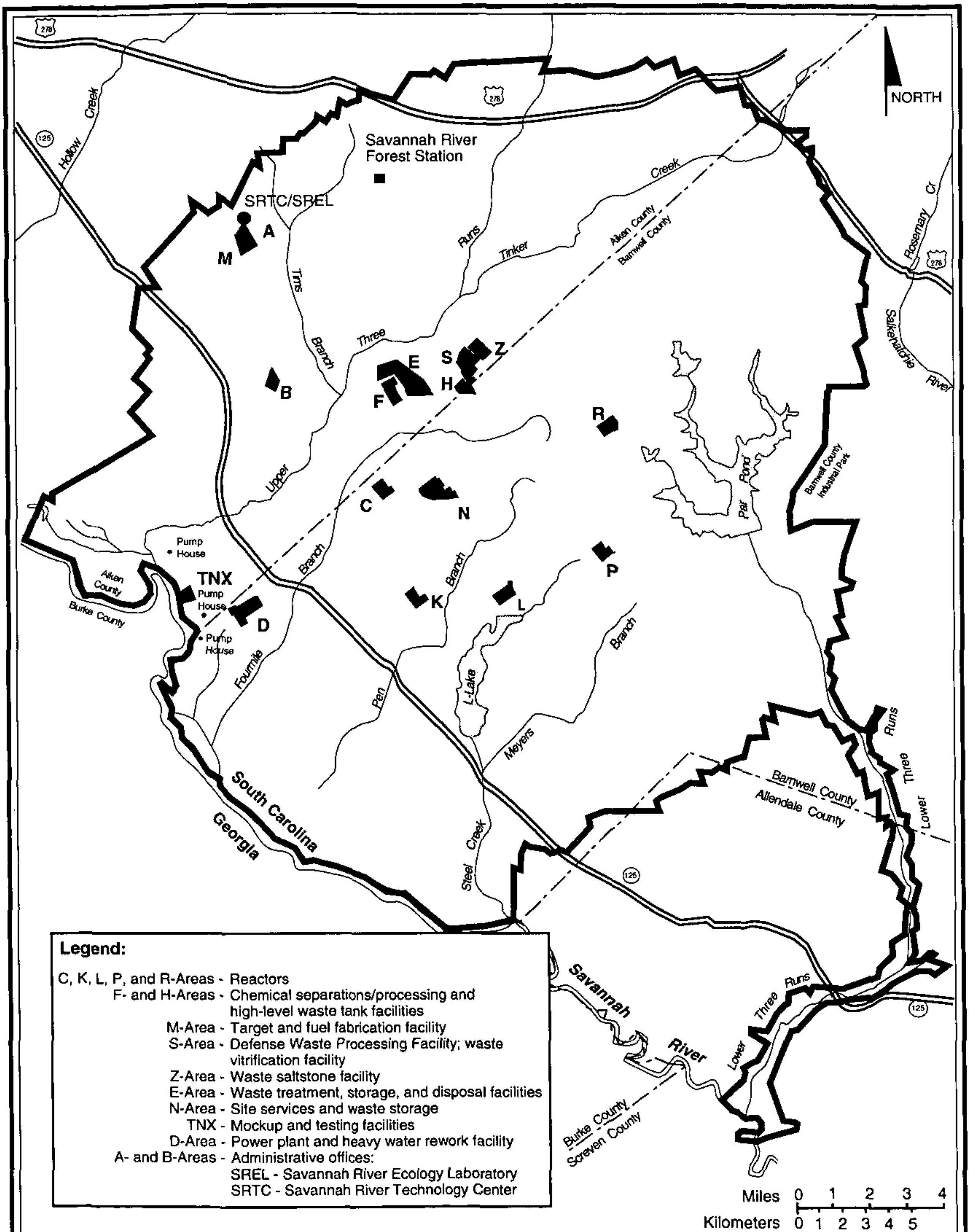

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Figure S-3. SRS areas and facilities.

the future. The receipt of wastes from other facilities and ongoing operations at SRS make much smaller contributions to waste volume.

In eight resource categories -- socioeconomics, groundwater, surface water, air, traffic, transportation, occupational health, and public health -- there would be very small impacts. Cleared and uncleared land would be disturbed to build new facilities, which would impact ecological resources, would limit future land-use options, and might impact geologic (soils) and cultural resources. Additional conclusions from the analyses are summarized below and in Table S-2: TE

- Impacts and benefits of alternative ways to reduce the volume of low-level waste were evaluated. Under alternative A, low-level wastes would be compacted, resulting in a 22-percent reduction in the disposal volume. The size reduction (e.g., sorting, shredding and melting), supercompaction, and incineration proposed in alternative B would reduce the volume by 75 percent although with an increased (but still small) impact on the health risks to remote populations. Soil sorting and vitrification proposed in alternative C would reduce the volume of low-level waste by 70 percent. TC

- Construction and operation of facilities would be required for each alternative. In general, waste treatment by facilities proposed in the alternative involving extensive treatment (alternative C) would produce higher operational impacts than those in the alternative involving limited treatment (alternative A) because more handling and processing of wastes generally produces more emissions and greater worker exposure.

- Conversely, the limited-treatment alternative (alternative A) would require more disposal capacity and disposal facilities with more sophisticated methods of containment (i.e., more vaults and less shallow land disposal), because alternative A would not reduce or immobilize wastes to the degree that alternative C (extensive treatment configuration) would.

- The moderate-treatment alternative (alternative B) uses options from alternative A and alternative C, depending on the type of waste and its characteristics and physical properties, to balance the trade-offs between extensive treatment (the basis of alternative C) and extensive disposal (the basis of alternative A). Variations in the implementation of alternative B would result in impacts that would fall somewhere between those from the less stable waste forms produced in alternative A and those from the greater operational emissions produced in alternative C. Impacts would be very small for each of the alternatives. TE TE TC

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- The no-action alternative would require more storage facilities at the end of the 30-year period of analysis than any other alternative. Under the no-action alternative, mixed and transuranic wastes would not have been treated or disposed of during the 30-year period considered in this EIS, which would increase the probability of potential environmental impacts, including accidents and worker radiological exposure, above those of the other alternatives. The impacts would be deferred under the no-action alternative, not avoided. In addition, some impacts would be incurred during the 30-year storage period as a result of normal operations.

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- Although this EIS does not establish the amount of waste that SRS would be required to manage in the future, it evaluates waste management requirements based on minimum, expected, and maximum forecasts. Managing the maximum amount of waste in any of the alternatives, would require clearing approximately 1,000 acres. It would be difficult to clear this much land in a heterogeneous landscape, such as occurs at SRS, without measurably affecting the ecological resources of the area. The loss of this much natural habitat would result in the loss of large numbers of individual animals. Although there are 733 square kilometers (181,000 acres) of forested land on SRS, committing 1,000 acres to waste management under the maximum waste forecast would more severely restrict future land-use options than managing the minimum or expected waste forecasts, which would require less land.

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- Under the various alternatives and wastes forecasts, tritium released to the Savannah River from groundwater beneath E-Area seeping into Upper Three Runs would reach its highest concentration in 70 to 237 years. However, the concentration would be very small and would remain well within drinking water standards under each alternative.

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- Groundwater impacts from shallow land and vault disposal would be very small. Exceedances of health-based standards that were identified in the draft EIS would not occur for two reasons. First, after the draft EIS was issued, DOE reevaluated the isotopic inventory of wastes and determined that curium-247 and -248 are not present at detectable concentrations in the wastes. Therefore, these radionuclides were removed from the waste inventories considered in the EIS groundwater analysis. Second, the draft EIS groundwater analysis did not account for the reduced mobility of the stabilized waste forms, such as ashcrete and glass, that might be placed in slit trenches under alternative A, B, or C. The analysis in this final EIS instead assumes that the performance of stabilized waste forms would conform with the performance objectives of DOE Order 5820.2A.

- Airborne emissions of nonradiological constituents would not increase appreciably over current emissions and would remain within applicable state and Federal standards for each alternative. Radiological emissions and the resulting doses to the public and workers would remain within EPA standards. Over the 30-year evaluation period, these emissions would increase the risk of a fatal cancer to the maximally exposed member of the public by less than 2 in 100 million for the no-action alternative to about 6 in 100,000 under alternative C – maximum forecast.

- Under each alternative, additional commuter traffic and truck shipments on SRS and nearby roads would not exceed the capacity of these roads.

- Risk to workers at SRS and the public from exposure to toxic chemicals resulting from accidents would be very small and similar for each alternative. All workers follow stringent Occupational Safety and Health Act requirements when handling toxic chemicals. Facilities where toxic chemicals are handled are some distance from the SRS boundaries, so the risk of exposure to the public is minimal. TC

- Projected facility costs and manpower requirements differ between the draft and final EIS. This is due to the following factors: a refinement of the parameters that determine operating manpower, building, and equipment costs; a correction to the scope of no-action alternative costs to make them consistent with the other alternative – waste forecast estimates; and new initiatives in alternative B that lowered facility costs for this alternative. In addition, the costing methodology bases construction manpower requirements on building and equipment costs; therefore, both operating and construction employment differ between draft and final EIS. This, in turn, affects projections of socioeconomic and traffic impacts. The cost analysis was changed to be consistent with the *Baseline Environmental Management Report* developed by DOE to ensure consistent reporting or estimating future facility construction and operation costs. This report is used to establish future budgetary requirements for the DOE complex. TC

- Costs for implementing each alternative were estimated for comparison purposes. Because detailed designs have not been developed for all facilities, these are only preliminary estimates of the likely costs. However, since they were developed for all alternatives from a consistent set of assumptions, they provide a reasonable basis for comparisons. As shown in Table S-3, in terms of life-cycle costs, the implementation of the moderate treatment alternative for the minimum and expected waste forecasts would be equal to implementation of the limited treatment alternative and more costly than the extensive treatment alternative. Implementation of the limited treatment alternative for the maximum waste forecast would be somewhat more costly than implementation TC TC

TC of the moderate treatment alternative, which in turn would cost more than the extensive treatment alternative.

Table S-2 summarizes and compares the potential environmental impacts of the four waste management TE alternatives; these impacts would result from land clearing and the construction and operation of new facilities. The table focuses on the expected waste forecast, but it also presents the minimum and maximum waste forecasts when this is important to fully appreciate the impacts. In general, the impacts TE vary in proportion to the amount of waste that DOE would handle, but even in the maximum waste forecast, they are very small.

Table S-3 presents the storage, treatment, disposal, and cost requirements for the four management alternatives (no-action, limited treatment configuration, moderate treatment configuration, and extensive treatment configuration) and the three waste forecasts (minimum, expected, and maximum).

Table S-1. Summary of new waste management facilities proposed for each alternative and waste forecast.

Facility or treatment	No action	Alternative A			Alternative B			Alternative C		
		Minimum	Expected	Maximum	Minimum	Expected	Maximum	Minimum	Expected	Maximum
Storage										
Long-lived low-level waste storage buildings	24	7	24	34	7	24	34	7	24	34
Mixed waste storage buildings	291	45	79	757	39	79	652	39	79	652
Transuranic and alpha waste storage pads	19	3	12	1,168	2	10	1,168	2	11	1,166
Organic waste tanks in S-Area	4									
Organic waste tanks in E-Area	26									
Aqueous waste tanks in E-Area	43									
Treatment										
Consolidated Incineration Facility		MW[a], HW[b]; modify for soils and sludge	MW, HW; modify for soils and sludge	MW, HW, WWTF[c] effluent; modify for soils and sludge	MW, LLW[d], HW; modify for soils and sludge	MW, LLW, HW	MW, LLW, HW, WWTF effluent	MW, LLW, HW, alpha until vitrification is available	MW, LLW, HW, alpha until vitrification is available	MW, LLW, HW, alpha until vitrification is available
Containment building		MW	MW	MW; modify at WWTF	MW	MW	MW; modify at WWTF	MW, HW; includes wet oxide and R&R[e]	MW, HW; includes wet oxide and R&R	MW, HW; includes wet oxide and R&R
Soil sort facility		MW	MW	MW	LLW	LLW	LLW	NA[f]	NA	NA
Transuranic waste characterization/certification facility		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Small quantity offsite treatment of mixed waste and PCBs		MW, PCBs	MW, PCBs	MW, PCBs	MW, PCBs	MW, PCBs	MW, PCBs	PCBs	PCBs	PCBs
Offsite smelting of low-activity equipment waste		NA	NA	NA	Yes	Yes	Yes	Yes	Yes	Yes
Offsite volume reduction of low-activity waste		NA	NA	NA	Yes	Yes	Yes	NA	NA	NA
Non-alpha waste vitrification		NA	NA	NA	NA	MW	MW	MW, LLW, HW	MW, LLW, HW	MW, LLW, HW
Alpha waste vitrification		NA	NA	NA	Yes	Yes	Yes	Yes	Yes	Yes
Disposal										
Shallow land disposal trenches	29	25	73	644	37	58	371	45	123	576
Low-activity waste vaults	10	9	12	31	1	1	8	2	2	5
Intermediate-level waste vaults	5	2	5	31	2	5	9	1	2	3
RCRA-permitted disposal facilities	1	21	61	347	20	21	96	10	40	111

a. MW = mixed waste.
b. HW = hazardous waste.
c. WWTF = Wastewater treatment facility.
d. LLW = low-level waste.
e. R&R = roast and retort.
f. NA = the facility is not part of the alternative.

Table S-2. Summary comparison of environmental impacts of each alternative.

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Area of impact	No-action alternative	Limited treatment configuration (alternative A)	Moderate treatment configuration (alternative B)	Extensive treatment configuration (alternative C)
Public Health				
Expected waste forecast: Offsite MEI[a]; fatal cancer probability[b]	4.1×10^{-10}[c]	5.8×10^{-9}	1.7×10^{-8}	9.0×10^{-8}
Offsite Population; fatal cancers[d] (1993 baseline: 0.11)	3.5×10^{-6}	2.8×10^{-4}	7.5×10^{-4}	0.0050
Maximum waste forecast: Offsite MEI[a]; fatal cancer probability[b]	Not applicable	4.0×10^{-8}	1.7×10^{-7}	2.0×10^{-6}
Offsite population; fatal cancers[d] (1993 baseline: 0.11)	Not applicable	0.0017	0.007	0.11
Occupational Health				
Involved worker; fatal cancer probability[b]	1.0×10^{-5}	1.3×10^{-5}	1.5×10^{-5}	1.6×10^{-5}
Involved worker; fatal cancers[d] (1993 baseline: 3.3)	0.021	0.028	0.032	0.034

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Accidents (highest risk for each receptor)

	No-action LCF[e]	No-action F[f]	No-action R[g]	Limited treatment configuration (alternative A)	Moderate treatment configuration (alternative B)	Extensive treatment configuration (alternative C)
Uninvolved worker at 100 meters (328 feet)	0.052	0.02	0.001	All values are same as no action	All values are same as no action	All values are same as no action
Uninvolved worker at 640 meters (2,100 feet)	9.2×10^{-4}	0.02	1.8×10^{-5}			
MEI	1.7×10^{-5}	0.02	3.3×10^{-7}			
Offsite population; fatal cancers	0.84	0.02	0.017			

Table S-2. (continued).

Area of impact	No-action alternative	Limited treatment configuration (alternative A)	Moderate treatment configuration (alternative B)	Extensive treatment configuration (alternative C)	TE
Air Resources					
Construction Increase of criteria pollutants over baseline (in micrograms per cubic meter); baseline: [170.63 (standard = 40,000)] largest increase would be carbon monoxide (1-hour standard) reported here	1,919	769	673	737	
Operations Offsite MEI dose (millirem per year) (see Public Health for health effects)	1.2×10^{-4}	0.011	0.032	0.18	
Population dose (person-rem per year)	2.9×10^{-4}	0.56	1.5	10	TC
Largest increase (in micrograms per cubic meter) would be carbon monoxide (1-hour standard)	24	Same as no action	31	Same as no action	
Surface Water Resources					
Construction Potential erosion impacts to SRS streams	Very small erosion impacts	Same as no action	Same as no action	Same as no action	
Operations Contaminant concentrations in Savannah River (tritium peaks in 70 to 237 years)	Very small; substantially below drinking water standards	Same as no action	Same as no action	Same as no action	

Table S-2. (continued).

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Area of impact	No-action alternative	Limited treatment configuration (alternative A)	Moderate treatment configuration (alternative B)	Extensive treatment configuration (alternative C)
Groundwater Resources[h]				
Minimum waste forecast	Not applicable	Pu-239[i]; 0.24 millirem per year	Pu-239[i]; 0.23	Pu-239[i]; 0.15
Expected waste forecast	Pu-239[i]; 0.33	Same as no action	Same as no action	Pu-239[i]; 0.21
Maximum waste forecast	Not applicable	Pu-239[i]; 0.79	Pu-239[i]; 0.43	Pu-239[i]; 0.25
Socioeconomics (baseline: 1995 SRS employment of 20,000)				
Expected waste forecast:				
Construction				
Peak number of jobs	50	80	170	160
Net change in regional construction employment	No net change	Same as no action	Same as no action	Same as no action
Impact	No impact	Same as no action	Same as no action	Same as no action
Operations				
Peak number of jobs	2,450	2,560	2,550	1,940
Mode of filling jobs	Reassignment of existing workers	Same as no action	Same as no action	Same as no action
Impact	No impact	Same as no action	Same as no action	Same as no action
Maximum waste forecast:				
Construction				
Peak number of jobs	Not applicable	260	310	350
Net change in regional construction employment		No net change	No net change	No net change
Impact		No impact	No impact	No impact
Operations				
Peak number of jobs		11,200	10,010	10,060
Mode of filling jobs		3,300 new jobs	2,110 new jobs	2,160 new jobs
Impact		Small impact	Small impact	Small impact

Table S-2. (continued).

Area of impact	No-action alternative	Limited treatment configuration (alternative A)	Moderate treatment configuration (alternative B)	Extensive treatment configuration (alternative C)
Land Use (impact measured in terms of land required)[j]				
Minimum[j] waste forecast: Land requirements in E-Area[k]	Not applicable	108 acres[l]	107	141
Expected[m] waste forecast: Land requirements in E-Area	241	152	158	167
Maximum[m] waste forecast: Land requirements in E-Area	Not applicable	254	254	254
Land requirements elsewhere on SRS		802	756	775
Ecological and Geologic Resources (impact measured in terms of acres to be cleared)				
Minimum waste forecast:	Not applicable	73	90	111
Expected waste forecast:	160	96	117	128
Maximum waste forecast:	Not applicable	986	940	959
Traffic				
Construction Peak vehicles per hour arriving at E-Area (1993 baseline: 741)	788	824	907	896
Operations Uninvolved truck traffic plus waste shipments per day (1993 baseline: 785)	815	817	819	814

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Table S-2. (continued).

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Area of impact	No-action alternative	Limited treatment configuration (alternative A)	Moderate treatment configuration (alternative B)	Extensive treatment configuration (alternative C)
Transportation - Incident free (additional excess fatal cancers)				
Involved workers	0.06 additional excess fatal cancer per year could develop	0.12 additional excess fatal cancer per year could develop	0.098 additional excess fatal cancer per year could develop	0.079 additional excess fatal cancer per year could develop
Uninvolved workers	8.4×10^{-4} additional excess fatal cancer per year could develop	8.8×10^{-4} additional excess fatal cancer per year could develop	8.9×10^{-4} additional excess fatal cancer per year could develop	8.6×10^{-4} additional excess fatal cancer per year could develop
Remote populations	Not applicable	1.2×10^{-6} additional excess fatal cancer per year could develop	3.2×10^{-3} additional excess fatal cancer per year could develop	2.7×10^{-4} additional excess fatal cancer per year could develop

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Area of impact	No-action LCF[e]	No-action P[n]	No-action R[o]	Alt. A LCF[e]	Alt. A P[n]	Alt. A R[o]	Alt. B LCF[e]	Alt. B P[n]	Alt. B R[o]	Alt. C
Transportation - Accidents (latent cancer fatalities over 30 years)										
Onsite population	120	2.6×10^{-6}	3.2×10^{-4}	Same as no action			Same as no action			Same as no action
Offsite population	14	2.6×10^{-6}	3.5×10^{-5}	Same as no action			Same as no action			Same as no action
Remote population (enroute to offsite facility)	NA[p]	NA	NA	2.4×10^{-6}	0.0011	2.5×10^{-9}	0.18	1.6×10^{-6}	2.9×10^{-7}	Same as alternative A

a. MEI = maximally exposed individual.
b. Values represent the annual probability of an individual (MEI or worker) contracting a fatal cancer due to 30 years of exposure to radiation from waste management activities at SRS.
c. An explanation of scientific notation is provided in Acronyms, Abbreviations, and Use of Scientific Notation.
d. Values represent the number of annual fatal cancers to a group (offsite population or onsite involved workers) due to 30 years of radiation exposure. Baseline is the number of annual fatal cancers that could result from exposure to radiation released in 1993.
e. Latent cancer fatalities per accident (dose × cancer conversion factor).
f. Frequency of occurrence (accidents per year).
g. Risk defined as estimates of increased risk of a latent cancer fatality per year (frequency × latent cancer fatalities per accident).
h. Values are peak dose per year. All would occur more than 10,000 years in the future. No exceedances of 4 millirem per year drinking water standard.
i. Pu = plutonium. Dose does not include contribution from disposal of stabilized waste forms in slit trenches or waste in RCRA-permitted vaults. Groundwater impacts from all vaults and shallow land disposal would be less than 4 millirem per year.
j. Acreage shown is the cumulative amount needed for construction activities over the 30-year period.
k. Current land-use plans have designated E-Area as an area for waste management facilities.
l. To convert from acres to square kilometers, multiply by 0.004047.
m. Acreage shown is the greatest amount needed for construction activities at any time during the 30-year period.
n. Annual probability of occurrence over the 30-year forecast period.
o. Risk defined as estimates of annual increased risk of latent cancer fatality over the 30-year period (probability × latent cancer fatalities per accident.)
p. NA = not applicable. (There are very few offsite radioactive waste shipments under the no-action alternative).

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Table S-3. Treatment, storage, and disposal requirements for and cost of each alternative and waste forecast.

Alternative	Additional treatment, storage, and disposal facilities for each alternative[a] — Waste forecast: Minimum	Expected	Maximum
No action		**STORAGE:** Buildings 24 long-lived low-level waste 291 mixed waste Pads 19 transuranic and alpha waste Tanks 4 organic waste in S-Area 26 organic waste in E-Area 43 aqueous waste in E-Area **TREATMENT:** Continue ongoing and planned waste treatment activities **DISPOSAL:** 29 shallow land disposal trenches 10 low-activity waste vaults 5 intermediate-level waste vaults 1 RCRA[b] disposal facility **COST** [c]: $\$6.9\times10^{9}$[d]	
A	**STORAGE:** Buildings 7 long-lived low-level waste 45 mixed waste Pads 3 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast **DISPOSAL:** 25 shallow land disposal trenches 9 low-activity waste vaults 2 intermediate-level waste vaults 21 RCRA disposal facilities **COST:** $\$4.2\times10^{9}$	**STORAGE:** Buildings 24 long-lived low-level waste 79 mixed waste Pads 12 transuranic and alpha waste **TREATMENT:** Continue ongoing and planned waste treatment activities; treat limited quantities of mixed and PCB waste offsite; operate the Consolidated Incineration Facility for hazardous and mixed waste, modify the facility to accept mixed waste soils and sludges; construct and operate a mixed waste containment building; construct and operate a mixed waste soil sort facility; construct and operate a transuranic waste characterization/certification facility **DISPOSAL:** 73 shallow land disposal trenches 12 low-activity waste vaults 5 intermediate-level waste vaults 61 RCRA disposal facilities **COST:** $\$6.9\times10^{9}$	**STORAGE:** Buildings 34 long-lived low-level waste 757 mixed waste Pads 1,168 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast, except containment building modified to include wastewater treatment capability to treat spent decontamination solutions; treat its secondary waste at the Consolidated Incineration Facility **DISPOSAL:** 644 shallow land disposal trenches 31 low-activity waste vaults 31 intermediate-level waste vaults 347 RCRA disposal facilities **COST:** $\$24\times10^{9}$

TC

Table S-3. (continued).

Alternative	Waste forecast: Minimum	Waste forecast: Expected	Waste forecast: Maximum
	Additional treatment, storage, and disposal facilities for each alternative (continued)		
B	**STORAGE:** Buildings 7 long-lived low-level waste 39 mixed waste Pads 2 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast, except no non-alpha vitrification facility; modify Consolidated Incineration Facility to accept mixed waste soils and sludges **DISPOSAL:** 37 shallow land disposal trenches 1 low-activity waste vault 2 intermediate-level waste vaults 20 RCRA disposal facilities **COST:** $\$4.2\times10^9$	**STORAGE:** Buildings 24 long-lived low-level waste 79 mixed waste Pads 10 transuranic and alpha waste **TREATMENT:** Continue ongoing and planned waste treatment activities; treat limited quantities of mixed and PCB wastes offsite; begin volume reduction of low-activity job-control and equipment waste offsite; begin smelting low-activity equipment waste offsite; operate the Consolidated Incineration Facility for low-level, hazardous, and mixed wastes; construct and operate a low-level waste soil sort facility; construct and operate a mixed waste containment building; construct and operate a non-alpha vitrification facility for mixed waste soils and sludges; construct and operate a transuranic waste characterization/certification facility; construct and operate an alpha vitrification facility **DISPOSAL:** 58 shallow land disposal trenches 1 low-activity waste vault 5 intermediate-level waste vaults 21 RCRA disposal facilities **COST:** $\$6.9\times10^9$	**STORAGE:** Buildings 34 long-lived low-level waste 652 mixed waste Pads 1,168 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast, except containment building modified to include wastewater treatment capability to treat spent decontamination solutions; treat its secondary waste at the Consolidated Incineration Facility **DISPOSAL:** 371 shallow land disposal trenches 8 low-activity waste vaults 9 intermediate-level waste vaults 96 RCRA disposal facilities **COST:** $\$20\times10^9$

TC

Table S-3. (continued).

Alternative	Waste forecast		
	Additional treatment, storage, and disposal facilities for each alternative (continued)		
	Minimum	Expected	Maximum
C	**STORAGE:** Buildings 7 long-lived low-level waste 39 mixed waste Pads 2 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast **DISPOSAL:** 45 shallow land disposal trenches 2 low-activity waste vaults 1 intermediate-level waste vault 10 RCRA disposal facilities **COST:** $\$3.8\times10^9$	**STORAGE:** Buildings 24 long-lived low-level waste 79 mixed waste Pads 11 transuranic and alpha waste **TREATMENT:** Continue ongoing and planned waste treatment activities; treat limited quantities of mixed and PCB wastes offsite; begin smelting low-activity equipment waste offsite; operate the Consolidated Incineration Facility for low-level, hazardous, and mixed waste until vitrification facility is available; construct and operate a hazardous and mixed waste containment building; construct and operate a non-alpha vitrification facility for low-level, hazardous, and mixed waste; construct and operate a transuranic waste characterization/certification facility; construct and operate an alpha vitrification facility **DISPOSAL:** 123 shallow land disposal trenches 2 low-activity waste vaults 2 intermediate-level waste vaults 40 RCRA disposal facilities **COST:** $\$5.6\times10^9$	**STORAGE:** Buildings 34 long-lived low-level waste 652 mixed waste Pads 1,166 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast **DISPOSAL:** 576 shallow land disposal trenches 5 low-activity waste vaults 3 intermediate-level waste vaults 111 RCRA disposal facilities **COST:** $\$18\times10^9$

TC

a. Facilities identified are in addition to those currently constructed; activities are in addition to ongoing or planned activities.
b. Resource Conservation and Recovery Act.
c. Life-cycle costs are expressed as present worth in 1994 dollars with 3 percent escalation and 6 percent discount rate (refer to Appendix C for details).
d. Source: Cost for no-action (Hess 1995e); cost for other alternatives (Hess 1995f).

CHAPTER 1. PURPOSE AND NEED FOR ACTION

The end of the Cold War has led the United States to reduce the size of its nuclear arsenal. Many of the more than 120 facilities across the country, referred to as the nuclear weapons complex, that the U.S. TE Department of Energy (DOE) used to manufacture, assemble, and maintain the former arsenal are no longer needed for these activities and could be used for other purposes. One of those facilities is the Savannah River Site (SRS). Many facilities can be converted to new uses through decontamination processes; others must be decommissioned (see Glossary for definitions of terms). TE In addition, the wastes generated during the Cold War must be cleaned up in a safe and cost-effective manner. DOE must also manage wastes that may be generated in the future by ongoing operations, including new defense facilities that may be located at SRS. Finally, SRS must be brought into compliance with the environmental requirements enacted during the last 25 years.

DOE must develop a strategic approach to managing radioactive and hazardous wastes at SRS to achieve the objectives of cleanup and compliance. The purpose of this environmental impact statement (EIS) is to evaluate the potential environmental effects of minimizing, treating, storing, and disposing of radioactive and hazardous wastes at SRS. DOE will use the analyses presented in the EIS to decide on a strategic approach to managing these wastes.

This EIS examines impacts of managing several types of wastes at SRS: liquid high-level radioactive, TE low-level radioactive, hazardous, mixed (radioactive and hazardous), and transuranic. It does not consider sanitary wastes or spent nuclear fuel. The impacts of managing liquid high-level radioactive wastes are described here based on the alternative to operate the Defense Waste Processing Facility as TC evaluated in the *Final Supplemental Environmental Impact Statement Defense Waste Processing Facility* (DOE/EIS-0082S) and selected in the Record of Decision (60 FR 18589). This EIS includes wastes that already exist as a result of past activities, and those that will be generated in the future as a result of ongoing operations, new projects, environmental restoration (i.e., cleaning up contaminants released into the environment in the past), and decontamination and decommissioning of facilities that are no longer needed. The inventory of existing wastes is known; predicting the amounts and types of wastes that will be generated in the future is difficult, particularly for those that will be generated during environmental restoration and facility decontamination and decommissioning.

At present, DOE cannot identify all of the facilities that will become surplus, or when a particular facility will no longer be needed to maintain the nuclear arsenal. Accordingly, DOE does not have a complete schedule of the facilities it will eventually decontaminate and decommission. In addition, DOE cannot TE identify at this time all of the contaminated areas at SRS that will require restoration. As a result of this uncertainty about the amounts of wastes that will be generated in the future, DOE uses a range of estimates. This range is bounded by estimates of the minimum and maximum amounts of wastes that may be generated in the future. It is the best forecast DOE can make at this time.

In addition to wastes that have been or will be generated at SRS itself, the Site may receive and manage wastes from other DOE facilities. Estimating the amounts of wastes to be received from other facilities in the future is even more difficult than predicting the amounts of wastes that will be generated at SRS. The amounts of offsite waste sent to SRS will depend on activities at other DOE facilities involving ongoing operations, waste management, environmental restoration, and decommissioning. These activities in turn depend on National Environmental Policy Act (NEPA) reviews DOE is conducting on: (1) the future needs of the nuclear weapons complex, including management of the nuclear stockpile and
TE | the means of production and location of facilities for tritium supply and recycling; (2) the possible consolidation of nuclear materials and wastes at certain facilities; and (3) the locations of treatment, storage, and disposal facilities in the complex. For purposes of this EIS, DOE has assumed that the wastes SRS will receive from other sites will fall somewhere between the amounts it now receives and a
TE | maximum estimate (included in the maximum waste forecast) that includes all wastes that have been identified to date as possible candidates for treatment, storage, or disposal at SRS.

The amounts of wastes that are actually generated and managed at SRS will depend on a number of decisions that have not yet been made. For example, decisions on the ultimate use of land and facilities at SRS will determine the level of cleanup necessary to meet regulatory requirements for those uses. The
TE | level of cleanup determines the amounts of waste generated during the cleanup; more stringent cleanup requirements lead to the generation of more wastes. This EIS considers the reasonable range of waste generation and management at SRS in the future. It evaluates the impacts of this range of wastes to allow for flexibility in managing wastes in response to changes in the amounts of wastes that may eventually be treated, stored, and disposed of at SRS.

DOE reviewed a number of options for treating, storing, and disposing of wastes at SRS. These options included technologies and facilities that already exist, and those that are under construction or
TE | development. This EIS evaluates the 30-year environmental impacts of the construction and operation of specific waste treatment, storage, and disposal facilities that might be developed at SRS during the next 10 years. It also evaluates the treatment of certain wastes by private entities, as well as the treatment and disposal of wastes at government facilities outside SRS. This evaluation included a detailed evaluation of new and emerging technologies that could be used to treat the wastes. At present, it is not possible to evaluate facilities that might be built beyond the next decade due to the uncertainties surrounding the types of wastes that might be generated and the types of new treatment technologies that might be

available. If DOE requires new treatment facilities more than 10 years in the future, it would conduct additional technology evaluations to ensure that the best available technology to treat the waste was selected. This EIS provides an environmental baseline for analyzing facilities that DOE might build and other actions to manage wastes that DOE might take after 2005. DOE would evaluate the environmental impacts of such facilities and activities in additional NEPA reviews that would rely, as appropriate, on this EIS for background information about SRS's environment. TE TE

The Federal Facility Compliance Act of 1992, an amendment to the Resource Conservation and Recovery Act (RCRA) (Public Law 102-386, October 6, 1992), requires DOE to prepare a site treatment plan for SRS that sets forth options for treating mixed wastes (i.e., mixtures of hazardous and radioactive wastes) currently in storage or that will be generated over the next 5 years. This EIS analyzes the environmental impacts of the facilities that DOE might use for treating mixed wastes as proposed in SRS's plan; the *DOE Waste Management Programmatic EIS* (DOE/EIS-0200), which discusses waste management throughout the nationwide DOE complex, also examines the possible impacts of treating mixed wastes at SRS and elsewhere. The alternatives evaluated here are consistent with the options presented in the site treatment plan. However, the plan is limited to options for treating mixed wastes currently in storage or generated during the next 5 years. This EIS evaluates alternatives for managing several types of wastes using existing, planned, and proposed facilities during the next 10 years. This EIS also establishes a baseline for assessing options for waste management for 20 years beyond that time. TE TE

DOE prepared an environmental assessment (DOE 1992) and issued a Finding of No Significant Impact [57 *Federal Register* (FR) 61402, December 24, 1992] on the construction and operation of the Consolidated Incineration Facility, which is currently under construction. This EIS responds to requests from citizens to re-examine the environmental impacts of operating the Consolidated Incineration Facility and provides a basis for future DOE decisions on operation of that facility. TE

On October 22, 1993, DOE stated that it would prepare this EIS for waste management at SRS (Grumbly 1993), and made a number of specific commitments: TE

- The EIS would consider both the facilities needed to treat mixed wastes, as required by the Federal Facility Compliance Act of 1992, and the operation of the Consolidated Incineration Facility.

- The proposed treatments of mixed waste would be factored into the formulation of alternatives for this EIS.

- DOE would evaluate volume reduction of low-level waste in the Consolidated Incineration Facility and other volume reduction alternatives (e.g., compaction).

TE

- The cost analysis of potential alternatives would be based on life-cycle costs (i.e., construction, operation, and decommissioning) of existing and planned facilities so that the costs of the Consolidated Incineration Facility would be realistically compared to the conceptual facilities.

- The incinerator's construction would continue on schedule, but trial burns would be deferred until this EIS is completed and its Record of Decision issued.

In addition to looking at the environmental impacts of actions that DOE may take over the next decade to manage wastes at SRS, this EIS also examines the cumulative impacts of the alternatives and past, present, and reasonably foreseeable future actions at SRS and adjacent areas.

Relationship to Other Environmental Analyses

TE

DOE must clean up and bring into compliance other facilities across the country that were involved in the production of nuclear weapons. DOE must address the cleanup of the nuclear weapons complex as an integrated program in order to reduce risks and restore the environment in the most cost-effective manner. Cleanup requires many decisions at each site, and decisions at one site may influence options and decisions at other sites.

DOE must formulate alternatives for waste management at SRS that are consistent with the alternatives considered in other EISs that relate to SRS. Consistency among other EISs and this EIS does not mean that the alternatives evaluated in each must match precisely; such precision is unnecessary and would be impossible to achieve given the broad scope of these EISs and the timing of decisions based on them. Consistency means that this EIS should reasonably take into account alternatives considered in other EISs that may impact the management of wastes at SRS.

TE

Several NEPA reviews that have been completed, are in process, or have been proposed examine SRS waste management or activities that could affect waste management decisions at SRS. These documents are briefly summarized in Table 1-1.

Table 1-1. Major NEPA reviews related to SRS waste management as of June 1, 1995.

Site	Title	NEPA document[a]	Status	
Savannah River Site	*Waste Management Activities for Groundwater Protection, Savannah River Plant*	DOE/EIS-0120	Final issued December 1987; ROD[b] issued March 1988.	
	Consolidated Incineration Facility, Savannah River Site	DOE/EA-0400	FONSI[c] issued December 1992.	
	Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel	DOE/EA-0912	FONSI issued April 1994.	
	Treatment of M-Area Mixed Wastes at the Savannah River Site	DOE/EA-0918	FONSI issued August 1994.	TC
	Defense Waste Processing Facility Supplemental EIS	DOE/EIS-0082S	Final issued November 1994; ROD issued April 1995.	
	F-Canyon Plutonium Solutions at SRS	DOE/EIS-0219	Final issued December 1994; ROD issued February 1995.	
	Interim Management of Nuclear Materials at SRS	DOE/EIS-0220	Draft issued March 1995.	
	Operation of the HB-Line Facility and Frame Waste Recovery Unit for Production of Plutonium-238 Oxide	DOE/EA-0948	FONSI issued April 1995.	TE
	Independent Waste Handling Facility, 211-F at Savannah River Site, Aiken, South Carolina	DOE/EA-1062	Draft issued June 1995.	
Idaho National Engineering Laboratory	*Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs*	DOE/EIS-0203	Final issued April 1995; ROD issued June 1995.	
Pantex	*Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components*	DOE/EIS-0225	Draft scheduled for November 1995.	
DOE-wide	*Waste Management Programmatic EIS*	DOE/EIS-0200	Draft scheduled for July 1995.	
	Tritium Supply and Recycling Programmatic EIS	DOE/EIS-0161	Draft issued February 1995.	TC
	Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel	DOE/EIS-0218	Draft issued April 1995.	
	Long-Term Storage and Disposition of Weapons-Usable Fissile Materials Programmatic EIS	DOE/EIS-0229	Draft scheduled for December 1995.	
	Stockpile Stewardship and Management Programmatic EIS	DOE/EIS-0236	Notice of Intent to be issued.	

a. EA = environmental assessment; EIS = environmental impact statement; PEIS = programmatic EIS.
b. ROD = Record of Decision. TE
c. FONSI = Finding of No Significant Impact.

WASTE MANAGEMENT ACTIVITIES FOR GROUNDWATER PROTECTION (DOE/EIS-0120)

In 1987 DOE issued a programmatic and project-specific EIS to support the selection of a programmatic waste management strategy for SRS and to consider the environmental impacts of several specific projects, including closure and cleanup of active and inactive waste management sites; establishment of new waste storage and disposal facilities; and alternative means of discharging disassembly basin purge water from SRS reactors. A Record of Decision was issued in March 1988. This first waste management EIS provided the NEPA review for several of the waste management facilities and activities currently operating or being initiated at SRS. (For more information, see Table 2-21 in Chapter 2.) Changes since 1988 in SRS missions, the regulatory environment, and other factors have led to the need to reexamine SRS waste management strategies in the current EIS.

CONSOLIDATED INCINERATION FACILITY (DOE/EA-0400)

As explained above, construction of the Consolidated Incineration Facility is continuing on the basis of an environmental assessment and Finding of No Significant Impact issued for this facility in 1992. DOE expects that its decision on conducting trial burns, operating the facility, and the wastes that would be
TC treated will be based on the analyses in this EIS.

TREATMENT OF M-AREA MIXED WASTE AT THE SAVANNAH RIVER SITE (DOE/EA-0918)

In 1994 DOE issued an environmental assessment and Finding of No Significant Impact on treating six mixed waste streams by vitrification in a facility to be built and operated in M-Area by a commercial vendor. This project is proceeding on the basis of the previous NEPA review. Treatment of additional wastes in the M-Area vitrification facility is among the actions considered in this EIS.

UPGRADE OF INDEPENDENT WASTE HANDLING FACILITY, 211-F, AT THE SAVANNAH RIVER SITE (DOE/EA-1062)

The facility to be upgraded (211-F) is the only facility on SRS that receives liquid low-activity radioactive waste from remote SRS locations, neutralizes it, and concentrates it to minimize volume before transferring it to the tank farm for further processing/storage. The facility currently gets support services, such as electric power, waste transfer capabilities, and instrument air from the F-Canyon building. After F-Canyon is deactivated, the 211-F facility will need to operate independently in order to support SRS facilities, such as the Savannah River Technology Center, which produce limited amounts of low-level radioactive waste as a result of ongoing missions. TE

Proposed upgrades to the facility will ensure that the 211-F waste handling operations are independent of the F-Canyon processes and services.

URGENT-RELIEF ACCEPTANCE OF FOREIGN RESEARCH REACTOR SPENT NUCLEAR FUEL (DOE/EA-0912)

DOE prepared an environmental assessment for the urgent acceptance of spent nuclear fuel elements from eight foreign research reactors and issued a Finding of No Significant Impact. The spent fuel will be shipped to the United States and transported to SRS for storage. TC The *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs EIS* (discussed below) evaluates management alternatives for the spent fuel elements. The expected waste forecast in this EIS is consistent with waste volumes that would be generated from receiving, storing, and handling the spent research reactor fuel, but not from processing it. TC

PROPOSED NUCLEAR WEAPONS NONPROLIFERATION POLICY CONCERNING FOREIGN RESEARCH REACTOR SPENT NUCLEAR FUEL (DOE/EIS-0218) TC

DOE is preparing an EIS to evaluate the potential impacts of the adoption and implementation of a policy to accept foreign research reactor spent nuclear fuel that contains uranium enriched in the United States. Under the proposed policy, the United States would accept approximately 24,300 fuel elements of highly enriched uranium or low-enriched uranium from foreign research reactors in approximately 30 nations during a 10- to 15-year period. The implementation of this policy would result in the receipt of spent nuclear fuel at one or more United States marine ports of entry and overland transport to one or more DOE sites (including SRS). The expected waste forecast in this EIS is consistent with waste volumes that would be generated from receiving, storing, and handling the spent research reactor fuel, but not from processing it. TC

INTERIM MANAGEMENT OF NUCLEAR MATERIALS AT SRS (DOE/EIS-0220)

DOE is preparing an EIS on interim management of nuclear materials that will evaluate in-process and stored nuclear materials at SRS to determine whether any materials require near-term stabilization to ensure continued safe management. Wastes incidental to the management activities included in TC

TC alternative 4 of the draft *Interim Management of Nuclear Materials EIS* (March 1995) are considered in this EIS under the expected waste forecast. Alternative 4 includes processing to oxide, repackaging, continued storage, and vitrification of various nuclear materials at SRS. The minimum waste forecast includes waste volumes associated with alternative 1 (the no-action alternative) of the *Interim Management of Nuclear Materials EIS,* which proposed continued storage of all SRS nuclear materials. The maximum waste forecast was based on alternative 2, which included more processing and vitrification of nuclear materials at SRS than that proposed under alternative 4.

F-CANYON PLUTONIUM SOLUTIONS AT SRS (DOE/EIS-0219)

TC DOE issued a final EIS on plutonium solutions currently stored in F-Canyon that evaluates alternatives for stabilization of these materials. The alternatives examined are no-action, processing to a plutonium metal, processing to a plutonium oxide, and transferring the solutions to the high-level waste tanks for vitrification in the Defense Waste Processing Facility. TC In February 1995, DOE issued the Record of Decision to implement the alternative of processing to metal. Wastes incidental to these activities are considered in this EIS under the expected and maximum waste forecasts.

DEFENSE WASTE PROCESSING FACILITY (DOE/EIS-0082S)

The Defense Waste Processing Facility is almost complete, and the high-level waste pretreatment processes and the vitrification process are nearly ready to begin operating. The evaluation of whether to continue construction and how to operate the Defense Waste Processing Facility was the subject of a separate NEPA review (DOE 1994). TC TE In April 1995, DOE published a Record of Decision (60 FR 18589) to complete construction and startup testing, and begin operation of the Defense Waste Processing Facility. Management of the wastes generated by Defense Waste Processing Facility operations is considered in this EIS under all waste forecasts. The potential environmental impacts from the operation of the Defense Waste Processing Facility are included in the analysis of the alternatives in this EIS.

OPERATION OF THE HB-LINE FACILITY AND FRAME WASTE RECOVERY UNIT FOR PRODUCTION OF PLUTONIUM-238 OXIDE (DOE/EA-0948)

DOE has prepared an environmental assessment addressing future operations of the HB-Line Facility and the Frame Waste Recovery Unit at SRS to process the remaining civilian inventory of plutonium-238 materials for use as a heat source fuel in space missions. TE TC In April 1995, DOE issued a Finding of No Significant Impact concluding that the proposed action was not a major federal action significantly affecting the quality of the human environment and would, therefore, not require the preparation of an

EIS. The waste generated by the processing of plutonium-238 materials is considered in this EIS under all waste forecasts. TE TC

PROGRAMMATIC SPENT NUCLEAR FUEL MANAGEMENT AND IDAHO NATIONAL ENGINEERING LABORATORY ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT PROGRAMS (DOE/EIS-0203)

In April 1995, DOE issued the final programmatic EIS which addresses alternatives for complex-wide management of existing and projected quantities of spent nuclear fuel until 2035. The alternatives considered in the programmatic EIS include variations on several components: number of storage locations; amounts of spent nuclear fuel shipped; fuel stabilization methods; numbers and types of new storage facilities; and scope of research and development efforts related to spent fuel management technology. The programmatic EIS could have lead to a decision to maintain, increase, or decrease the amount of spent nuclear fuel managed at SRS. Among the options considered was renewed processing of spent nuclear fuel at SRS, which would generate additional high-level waste. The preferred alternative identified in the final programmatic EIS and selected in the Record of Decision (60 FR 28680), regionalization of spent fuel management by fuel type, will consolidate the management of aluminum-clad fuel at SRS. This will involve a moderate increase over current levels of the fuel currently managed at SRS; implementation of this alternative might involve fuel processing at SRS, pending future decisions. The maximum waste forecast here is consistent with the waste volumes associated with the selected alternative for this spent fuel EIS including wastes generated during processing of aluminum-clad fuel from within the DOE complex. The impacts of the programmatic alternative with the greatest potential impacts to SRS (i.e., the centralization of all DOE spent fuel management, including processing, at SRS, not the selected alternative) are included in the cumulative impacts analysis of this EIS. Aspects of the management of liquid high-level radioactive waste are the same under each alternative, thus volume changes due to decisions made as a result of the programmatic spent fuel EIS will not affect the selection of alternatives here. TC

CONTINUED OPERATION OF THE PANTEX PLANT AND ASSOCIATED STORAGE OF NUCLEAR WEAPON COMPONENTS (DOE/EIS-0225)

DOE is preparing an EIS that addresses the proposed continued operation of the Pantex Plant and continued current nuclear component storage activities at various DOE sites. SRS may be considered as a possible location for the recycling of tritium and plutonium from the Pantex Plant. The maximum waste forecast in this EIS is consistent with the waste volumes incidental to the activities included in DOE's preliminary proposed action for the Pantex Plant. TE

TE WASTE MANAGEMENT (DOE/EIS-0200)

TE DOE is preparing a programmatic EIS to evaluate complex-wide and site-specific alternative strategies and policies to maximize efficiency in DOE's waste management programs. DOE has attempted to coordinate this EIS with the programmatic EIS so that the alternatives considered in this EIS are as consistent as possible with the DOE complex-wide strategies to be analyzed in the programmatic EIS. If necessary, DOE will supplement this EIS to maintain consistency with future DOE-wide programmatic waste management decisions. The strategies and policies to be considered in the programmatic EIS include the possible transfer of some waste types from other DOE sites to SRS for treatment and disposal, and the possible transfer of some SRS wastes to other DOE sites. Those possible waste transfers are also considered in this EIS, under the maximum and minimum waste forecasts, respectively.

TE TRITIUM SUPPLY AND RECYCLING (DOE/EIS-0161)

TE DOE is preparing a programmatic EIS to address reconfiguration of the nuclear weapons complex. DOE intends to separate the reconfiguration proposal into two parts and will prepare a programmatic EIS on each part (59 FR 54175, October 28, 1994). The first programmatic EIS is the *Tritium Supply and Recycling Programmatic EIS*, which addresses alternatives associated with new tritium production and the recycling of tritium recovered from weapons retired from service. The EIS analyzes alternative technologies for producing tritium at five candidate sites, including SRS. It also assesses the same five sites as alternative locations for tritium recycling, which is currently done at SRS. Wastes from continued recycling of tritium at SRS are considered in this Waste Management EIS under all waste forecasts. The maximum waste forecast in this Waste Management EIS is consistent with the collocated tritium supply and recycling at SRS alternative (based on the advanced light water reactor technology which generally would produce the largest waste volumes). The maximum forecast includes all waste associated with that alternative except for spent nuclear fuel (approximately 23 cubic meters per year) and liquid low-level wastes (5 million gallons per year) associated with the operation of a potential tritium supply.

TE STOCKPILE STEWARDSHIP AND MANAGEMENT (DOE/EIS-0236)

TC The second programmatic EIS related to the reconfiguration of the nuclear weapons complex is the *Stockpile Stewardship and Management Programmatic EIS.* Stockpile stewardship includes activities required to maintain a high level of confidence in the safety, reliability, and performance of nuclear weapons in the absence of underground testing, and to be prepared to test weapons if so directed by the

President of the United States. Stockpile management activities include dismantlement, maintenance, evaluation, and repair or replacement of weapons in the existing stockpile. The *Stockpile Stewardship and Management Programmatic EIS* will analyze the environmental impacts of alternatives for the missions necessary to carry out DOE's stockpile stewardship and management responsibilities. Decisions made based on the *Stockpile Stewardship and Management Programmatic EIS* could result in generation of high-level waste that might be immobilized at the Defense Waste Processing Facility. TC

LONG-TERM STORAGE AND DISPOSITION OF WEAPONS-USABLE FISSILE MATERIALS (DOE/EIS-0229) TE

DOE is preparing a programmatic EIS to assist in the development of a comprehensive national policy for the storage and disposition of weapons-usable fissile materials. The term weapons-usable fissile materials refers to a specific set of nuclear materials that could be used in making a nuclear weapon, but does not include the fissile materials in spent fuel or irradiated targets from reactors. TE TE

References

DOE (U.S. Department of Energy), 1992, *Environmental Assessment, Consolidated Incineration Facility, Savannah River Site,* DOE/EA-0400, Office of Environmental Restoration and Waste Management, Savannah River Plant, Aiken, South Carolina.

Grumbly, T. P., 1993, U.S. Department of Energy, Washington, D.C., letter to Brian Costner, Energy Research Foundation, Columbia, South Carolina, October 22.

CHAPTER 2. DESCRIPTIONS OF THE ALTERNATIVES

The U.S. Department of Energy (DOE) proposes to implement a waste management strategy for the Savannah River Site (SRS) that is protective of human health, complies with environmental regulations, prevents pollution, minimizes waste generation, uses effective and commercially available technology, and controls cost. The strategy must address minimization, treatment, storage, and disposal of liquid high-level radioactive [dealt with more fully in the Defense Waste Processing Facility Environmental Impact Statement (EIS) and supplemental EIS], low-level radioactive, hazardous, mixed (low-level radioactive and hazardous), and transuranic wastes at SRS. Such a strategy may be structured in several ways, depending on the elements that are emphasized, and may include both onsite and offsite applications of the technologies selected. This chapter describes the no-action alternative and the three action alternatives that DOE has proposed as waste management strategies; the action alternatives place TE different degrees of emphasis on treatment, storage, and disposal. These alternatives encompass the full range of reasonable alternatives. In addition, this chapter summarizes the results of studies that were necessary to define the alternatives and to evaluate them consistently. Finally, this chapter presents a summary comparison of the alternatives and their potential impacts. TE

The analyses of the alternatives are based on forecasts of the amounts of wastes that DOE could be required to manage over the next 30 years (1995 through 2024). Section 2.1 presents the forecasts of waste volumes; the radiological, physical, and other characteristics of each waste type; and their requirements for handling and management.

DOE used information available in spring and summer 1994 to forecast the expected, minimum, and maximum amounts of waste that would require management. Several factors make it difficult to predict TE the types and amounts of waste that will be managed over the 30-year period considered in this EIS. These factors are the result of a number of uncertainties. One uncertainty is the future mission of SRS. DOE is evaluating alternative missions in several programmatic EISs (see Chapter 1). Future decisions based on these ongoing EISs may include changes in operations at SRS and transfers of waste to SRS from the Department of Defense and between SRS and other DOE facilities. The decisions on SRS's TC future operations will affect the amount of waste SRS will manage. Another source of uncertainty is the future decisions regarding the extent of environmental restoration and decontamination and decommissioning at SRS which would substantially affect the amount of waste generated onsite over the 30-year analysis period. There is limited data on the waste types and volumes from environmental restoration and decontamination and decommissioning because specific cleanup criteria have not yet been established. Not all of the existing waste sites have been sufficiently characterized to determine how much or what type of remediation is necessary and, hence, how much remediation waste would be produced. Similarly, estimates of the waste that would be generated by the decontamination and decommissioning program were extrapolated from data based on inspections of a limited number of surplus facilities and, therefore, are uncertain.

Section 2.2 describes the no-action alternative, under which DOE would continue current practices for treatment and storage of liquid high-level radioactive waste, mixed and transuranic wastes, and low-level waste (primarily long-lived); disposal of low-level radioactive waste; and treatment and disposal of hazardous waste offsite. The no-action alternative provides a baseline for comparing environmental impacts of the alternatives. Because it is a baseline and represents a continuation of current practices, it is based on the expected 30-year waste forecast (Section 2.1.3).

For all but the no-action alternative, DOE investigated various combinations of waste minimization, pollution prevention, and technologies for treating, storing, and disposing of all waste types except high-level waste. The availability, advantages, and disadvantages of the potential technologies to treat the wastes must be understood before reasonable treatment, storage, and disposal systems for managing four of the five types of waste considered in this EIS can be determined. Note that the treatment and disposal options for high-level waste remain the same for all alternatives. Section 2.3 describes the technology evaluation process and the reasonable technologies that were chosen in developing the alternative systems of treatment, storage, and disposal. Under each alternative, DOE selected a mix of technologies which favorably met five criteria: process parameters (including degree of volume reduction, the amount of secondary waste generated, and the efficiency of process decontamination and
TE decommissioning); engineering parameters (including process maturity, availability, and ease of maintenance); environment, health and safety factors (public and occupational risks, environmental risks, and transportation requirements); public acceptance (including regulatory permitting and schedule considerations); and cost considerations.

DOE constructed two bounding waste management strategies that provide direction for choosing
TE treatment, storage, and disposal options for the various types of waste. The bounding strategies considered in this EIS and described in this chapter include:

- Limited treatment configuration (alternative A) (Section 2.4) - This strategy seeks to provide the minimum treatment required to meet applicable storage and disposal standards.

- Extensive treatment configuration (alternative C) (Section 2.5) - This strategy applies to treatment technologies that minimize the volume and toxicity of wastes and create highly migration-resistant waste forms.

Under alternative A, DOE would select technologies that provide the minimum treatment required to meet applicable storage and disposal standards and expeditiously store or dispose of the wastes in a manner that prevents or minimizes short-term releases to the environment. Although this strategy focuses on the narrow objective of minimizing short-term impacts, it uses reasonable technologies analyzed in Section 2.3. DOE believes that this strategy establishes one end of the range of alternatives that meets the purpose and need for action as described in Chapter 1.

The other bounding strategy, alternative C, is based on applying proven treatment technologies that reduce the volume and toxicity of waste and create a highly migration-resistant waste form. In general, construction and operation of new treatment facilities would result in greater short-term impacts than options presented for alternative A, but would provide a greater margin of safety against adverse long-term effects of the waste after disposal. TE

- Moderate treatment configuration (alternative B) (Section 2.6) – This mix includes limited treatment of some wastes and extensive treatment of others, depending on the particular characteristics of the waste. TE

DOE has identified the moderate treatment configuration, alternative B, as its preferred alternative based on the careful consideration of beneficial and adverse environmental impacts, regulatory commitments, and other relevant factors. The moderate treatment configuration would provide a balanced mix of technologies that includes extensive treatment of those waste types that have the greatest potential to adversely affect humans or the environment because of their mobility or toxicity if left untreated (such as wastes containing plutonium-238), or that would remain dangerously radioactive far into the future (such as wastes containing transuranics). It would provide less extensive treatment of wastes that do not pose great threats to humans or the environment, or that will not remain dangerously radioactive far into the future (such as non-alpha low-level waste).

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DOE bases its preference of alternative B on the following environmental impacts, regulatory commitments, and other factors:

- Mixed waste technology selections are compatible with the site treatment plan. When a waste in the EIS 30-year forecast was also included in the site treatment plan 5-year forecast, alternative B uses the same technology as that identified as the preferred treatment by the proposed site treatment plan.

- Mixed waste technology selections are consistent with DOE's commitments under the Land Disposal Restrictions Federal Facility Compliance Agreement with EPA.

- Transuranic waste technology selections are compatible with what the final Waste Isolation Pilot Plant waste acceptance criteria are expected to require. Treatment is provided only for those transuranic wastes that do not conform to the shipping requirements (i.e., plutonium-238 and higher activity plutonium-239). All other SRS transuranic wastes are expected to meet the Waste Isolation Pilot Plant waste acceptance criteria after repackaging and characterization/certification.

- Hazardous wastes are treated onsite subject to availability of treatment capacity and compatibility with technologies required to manage mixed waste.

- Alternative B provides the best volume reduction for low-activity waste (75 percent reduction in alternative B compared to 22 percent for alternative A and 70 percent for alternative C), conserves space in low-activity waste vaults, reduces the total number of low-activity waste vaults, and thus avoids expenditures of land and money.

- Alternative B also results in the fewest number of additional transuranic and alpha waste pads, shallow land disposal trenches, and RCRA-permitted vaults.

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- Alternative B results in the least construction-related air emissions.

- Alternative B employs less thermal treatment (technologies generally resulting in higher air emissions) than alternative C, resulting in smaller radiological air impacts than would occur in alternative C (e.g., fewer involved worker latent cancer fatalities and lower maximally exposed offsite individual fatal cancer probability).

In summary, DOE believes that alternative B provides the preferred configuration of treatment, storage, and disposal facilities for SRS. It maintains technology selection flexibilities that are not shared by alternatives based on strategies to provide limited (alternative A) or extensive (alternative C) treatment configurations.

Throughout the public comment period, DOE continued to consider many of the issues addressed in the draft EIS. As a result of these considerations, DOE identified improvements in the management of its wastes and modified the alternative configurations accordingly, particularly the moderate treatment alternative (alternative B) for low-level waste. Table 2-1 describes the most significant changes between the draft and final EIS, the alternatives they affect and the sections that describe the modifications and their benefits in greater detail. Additional changes between the draft and final EIS, including changes to align the technologies proposed for mixed wastes with the preferred alternatives presented in the proposed site treatment plan, are discussed in the appropriate sections for the affected alternatives.

Table 2-1. Major changes in alternative configurations between the draft and final EIS.

Facility	Alternative	Discussion
Transuranic and Alpha Waste	No-action, A, B, and C	**Draft EIS**: In the draft EIS, DOE assumed that generators could not distinguish between transuranic waste (greater than or equal to 100 nanocuries per gram) and alpha waste (less than 100 nanocuries per gram and suitable for onsite treatment and disposal). Under the no-action alternative DOE would continue to store transuranic and alpha waste. Under alternatives B and C, DOE proposed to store the transuranic and alpha waste until a transuranic waste characterization/certification facility could be constructed and begin operation. The facility would have treated transuranic and alpha waste. Alpha waste would have been disposed of onsite and transuranic waste would have been stored pending the availability of the Waste Isolation Pilot Plant. **Final EIS**: DOE believes that generators of transuranic wastes will have the capability to identify newly-generated alpha waste. In all alternatives in the final EIS newly-generated nonmixed alpha waste would be certified by the generators for disposal in the low-activity waste vaults. In alternatives A, B, and C newly-generated mixed alpha waste would be treated and certified for disposal in the Resource Conservation and Recovery Act (RCRA) vaults when they become operational in 2002. TC **Reference Sections**: 2.2.6, 2.4.6, 2.5.6, and 2.6.6
Offsite Low-level Waste Volume Reduction	B	**Draft EIS**: Under alternative B in the draft EIS, DOE would have treated approximately 50 percent of the low-activity job-control waste and tritiated job-control waste in the Consolidated Incineration Facility; treated about 40 percent in a newly constructed onsite supercompactor; and the remaining 10 percent placed directly into vaults. DOE also proposed to send 50 percent of the low-activity equipment waste to the onsite supercompactor. **Final EIS**: In the final EIS, DOE would still treat 50 percent of the low-activity job-control waste and tritiated job-control waste in the Consolidated Incineration Facility; the remaining tritiated job-control waste would be sent directly to disposal vaults. DOE would ship 50 percent of the low-activity job-control waste to a commercial facility for volume reduction and return it to SRS for further treatment or disposal. DOE would solicit proposals from commercial facilities for reducing the volume of low-level radioactivity waste in the future, and would require the facilities to supply information that DOE would use to prepare additional environmental reviews as required by 10 CFR 1021.216. For purposes of analysis in the final EIS, it is assumed that the

Table 2-1. (continued).

Facility	Alternative	Discussion
Offsite Low-level Waste Volume Reduction (continued)	B	waste would be treated offsite as follows: 60 percent supercompacted; 20 percent reduced in size and repackaged for treatment in the Consolidated Incineration Facility; 10 percent incinerated, the resulting ash supercompacted; 5 percent reduced in size and repackaged for disposal; and 5 percent melted, with the melt residue supercompacted DOE would also ship 50 percent of the low-activity equipment waste to a commercial facility to be supercompacted. For purposes of assessment, it is assumed that the offsite treatment facility would be located in Oak Ridge, Tennessee. **Reference Section**: 2.6.3
Offsite Treatment and Disposal of Hazardous Waste	B	**Draft EIS**: Under alternative B in the draft EIS, DOE proposed to ship approximately 89 percent of its hazardous waste offsite for treatment and disposal and to treat composite filters, paint waste, organic liquids, and aqueous liquids in the Consolidated Incineration Facility; some aqueous liquids would have been treated in the M-Area Air Stripper. **Final EIS**: DOE would increase the amount of hazardous waste that remains onsite for treatment in the Consolidated Incineration Facility. Fifty percent of the inorganic, organic, and heterogeneous debris groups and 100 percent of the organic and inorganic sludges would be incinerated onsite, in addition to the wastes proposed for incineration in the draft EIS. **Reference Section**: 2.6.4
Treatment of Alpha Waste in the Consolidated Incineration Facility	C	**Draft EIS**: In the draft EIS under alternative C, DOE assumed that alpha waste would be stored on site and treated in the alpha vitrification facility after it became operational in 2008. **Final EIS**: In the final EIS, DOE would burn 50 percent of the alpha-waste (both mixed and nonmixed) in the Consolidated Incineration Facility from 1996 to 2005, then discontinue incineration and begin vitrifying these wastes at the alpha vitrification facility in 2008. **Reference Section**: 2.5.6
Vitrification of High-Activity Plutonium-239 Waste	B	**Draft EIS:** In the draft EIS, DOE assumed that all of the plutonium-239 waste would be acceptable for shipment to the Waste Isolation Pilot Plant after repackaging. **Final EIS:** DOE believes that it would be necessary to vitrify the high-activity fraction of plutonium-239 waste to eliminate unacceptable levels of gas associated with the higher-activity material. In alternative B of the final EIS, DOE would treat the high-activity plutonium-239 waste in the alpha vitrification facility. **Reference Section:** 2.6.6

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On May 17, 1995, DOE published a notice in the *Federal Register* (60 FR 26417) describing these improvements and soliciting comments through June 12, 1995. Modification of the treatment of low-level waste proposed in the draft EIS would change the location, but not the treatment technologies, for the treatment of approximately 40 percent of the expected volume of this type of waste. In the draft EIS, alternative B included onsite incineration, supercompaction, or direct disposal of low-level waste. The final EIS includes onsite incineration or direct disposal, and supercompaction, size reduction (e.g., sorting, shredding, and melting), and incineration at an offsite commercial treatment facility. All residues from offsite treatment would be returned to SRS for future treatment or disposal. This modification is more advantageous than the original proposal because it provides immediate utilization of commercial volume reduction capacity, and negates the need for DOE to construct a supercompactor. This is not only cost-effective, but saves existing disposal capacity.

In addition to the changes described in detail in Table 2-1, volumes and treatments for some mixed wastes were modified between the draft and final EIS to make the EIS compatible with changes to the proposed site treatment plan. These changes dealt with smaller volumes of waste and are described in the mixed waste sections of the alternatives. TC

DOE proposed a short-term, temporary method of volume reduction for low-level waste in the draft *Environmental Assessment for the Offsite Volume Reduction of Low-Level Radioactive Waste from the Savannah River Site* (DOE/EA-1061). The proposed action, by a commercial facility in Oak Ridge, Tennessee, would reduce the volume of low-level waste at SRS in an expedient and cost effective manner over the near-term (prior to the start of fiscal year 1996). Because the impacts of the proposed action would be very small and the proposed action would not limit the selection of alternatives under consideration in this EIS, this proposed volume reduction qualifies as an interim action under National Environmental Policy Act (NEPA) regulations (40 CFR 1506.1).

DOE developed expected, minimum, and maximum waste forecasts for each waste type based on mid-1994 information about the disposition of the various wastes stored throughout the DOE complex. DOE evaluated the differences in waste management decisions that would result from the different volumes under the alternatives that meet the purpose and need for action as described in Chapter 1. Because the no-action alternative does not meet this purpose and need for action, DOE bases the no-action alternative solely on the expected waste forecast. The intent of the minimum and maximum waste forecasts is to identify how waste management needs would change within an alternative with different waste amounts, and to bound the impacts that might result from potential changes in the amount of waste SRS could be required to handle as a result of decisions based on other NEPA evaluations TE
currently underway and described in Chapter 1.

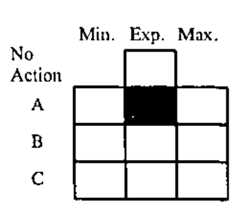
Based on the results of analyses in Chapter 4, Environmental Consequences, Section 2.7 summarizes and compares the environmental impacts of the alternatives (i.e., no-action, limited treatment, extensive treatment, and moderate treatment). Its intent is to clearly identify the critical issues for the public and to provide a sound basis for review by the decisionmaker. Cumulative impacts were assessed only for the moderate treatment alternative (alternative B) with the expected waste forecast since the impacts for this alternative generally fall between the other two action alternatives, and since the impacts do not vary greatly between alternatives. Despite some variation in impacts, this approach allowed DOE to assess TE the likely magnitudes of the cumulative impacts of the other alternatives based on the cumulative impacts of the moderate alternative. This EIS presents the no-action alternative first, followed by alternative A (limited treatment), alternative C (extensive treatment), and alternative B (moderate treatment).

Four alternatives and three waste forecasts are ultimately considered in this EIS. To help guide the reader, the stacked box symbol (Figure 2-1), is used throughout Chapters 2 and 4 to indicate the alternative and waste forecast being discussed. Shading indicates the alternative and forecast under consideration. Specific examples of this symbol are shown below.

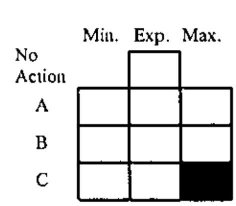
TE **Figure 2-1.** Explanation of grid symbol used in the *SRS Waste Management EIS.*

Alternative	Amount of waste to be managed		
	Minimum	Expected	Maximum
No action		Continue current waste management practices with the expected estimate of waste	
A	Limited treatment configuration; minimum estimate of waste	Limited treatment configuration; expected estimate of waste	Limited treatment configuration; maximum estimate of waste
B	Moderate treatment configuration; minimum estimate of waste	Moderate treatment configuration; expected estimate of waste	Moderate treatment configuration; maximum estimate of waste
C	Extensive treatment configuration; minimum estimate of waste	Extensive treatment configuration; expected estimate of waste	Extensive treatment configuration; maximum estimate of waste

For example,



Alternative A, expected waste forecast



Alternative C, maximum waste forecast

2.1 Waste Forecasts

This section describes the waste types and treatment categories discussed in this EIS. It provides estimates of the volumes of each of the five waste types: liquid high-level radioactive, low-level radioactive, hazardous, mixed low-level radioactive, and transuranic. DOE made assumptions regarding the future waste volumes to create a potential forecast for analysis. See Appendix A for these waste volume forecasts. The variations between the anticipated waste volumes in the forecasts are primarily a result of differences in assumptions about the environmental restoration and decontamination and decommissioning activities. TE TE

The assumptions DOE used to develop the waste forecasts were based on mid-1994 information from throughout the DOE complex. DOE recognized that the information available to predict the volumes and kinds of wastes that would be treated at SRS was subject to continual change as the DOE complex as a whole developed a waste management plan. For this reason, DOE tried to anticipate what might be treated at SRS, develop forecasts that it believes would encompass the most likely options, and analyze impacts for maximum and minimum waste forecasts, as well as what was considered most likely (or expected) at the time the forecasts were developed. However, if future decisions affect the waste volumes SRS anticipates treating so dramatically that the impacts fall outside the maximum-minimum envelope, DOE will prepare additional NEPA evaluations. TC

2.1.1 WASTE DESCRIPTIONS

Liquid high-level radioactive waste includes the highly radioactive material resulting from the reprocessing of spent nuclear fuel. This waste contains a combination of transuranic elements or isotopes and highly radioactive fission products in concentrations requiring permanent isolation, and hazardous constituents regulated under the Resource Conservation and Recovery Act (RCRA). DOE uses the F- and H-Area chemical separations plants to separate and purify plutonium-238 and plutonium-239 and to reclaim fissionable material (uranium-235) from onsite and offsite sources (e.g., research reactor fuel) for recycling. These processes dissolve fuel and target elements in nitric acid and separate them into (1) a solution of plutonium, uranium, and neptunium and (2) liquid high-level radioactive waste. Further processing separates and purifies the metals in solution, converts the plutonium to solid form for shipment, and prepares the other materials for shipment, storage, or reuse. The liquid high-level radioactive waste is stored in carbon steel tanks in the F- and H-Area tank farms. TE

Low-level radioactive waste is radioactive waste that is not classified as high-level waste, transuranic waste, or spent nuclear fuel, and does not contain waste designated as hazardous by RCRA. Typical solid low-level radioactive waste includes operating and laboratory wastes (e.g., protective clothing, plastic sheeting, gloves, analytical wastes, decontamination residue), contaminated equipment, reactor and reactor fuel hardware, spent lithium-aluminum targets from which tritium has been extracted, and spent deionizer resin from reactor areas. Liquid low-level radioactive waste includes tritiated oil (oil contaminated with tritium), process waste, evaporator condensate, and some storm and cooling waters. Numerous facilities listed in Table 2-2 and waste management, environmental restoration, and decontamination and decommissioning activities (including surveillance, maintenance, recovery, cleanup, and stabilization) generate low-level radioactive waste at SRS. Small amounts of additional low-level waste (less than 3 percent of the expected forecast low-level waste volume) are received at SRS from other DOE facilities and nuclear naval operations. The offsite low-level wastes consist primarily of job-control wastes and naval hardware but may include other materials such as soils and equipment or construction debris generated as a result of decommissioning activities.

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Table 2-2. Major facilities and types of waste generated at SRS.[a]

Facilities	Function	Waste types
Analytical Laboratories	Analytical services and testing	LLW[b], MW[c], TRU[d]
Defense Waste Processing Facility	High-level waste vitrification	LLW, HW[e], MW
F/H-Area Effluent Treatment Facility	Treatment of routine process effluent and wastewater	LLW, HW, MW
F/H-Area High-Level Waste Tanks	Storage and treatment of high-level waste supernatant, sludge, and saltcake	LLW, HW, MW
Reactor Materials (M-Area)	Fuel and target fabrication	LLW, HW, MW
Reactors	Production reactors currently in standby (K) or shutdown condition (C, L, P, and R)	LLW, HW, MW
Receiving Basin for Offsite Fuels/ Resin Regeneration Facility	Storage and packaging of offsite fuels, cleaning targets for processing, and processing deionizers	LLW
Replacement Tritium Facility	Tritium separation from targets	LLW, HW, MW
Separations (F- and H-Areas)	Chemical and physical processing of nuclear materials	HLW[f], LLW, HW, MW, TRU
Savannah River Technology Center	Research and development activities	LLW, HW, MW, TRU
Z-Area Saltstone Manufacturing and Disposal Facility	Saltcrete processing and disposal	LLW

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a. Source: WSRC (1994a).
b. Low-level radioactive waste.
c. Mixed waste.
d. Transuranic and alpha waste.
e. Hazardous waste.
f. Liquid high-level waste.

At SRS, low-level waste is segregated into several categories to facilitate proper treatment, storage, and disposal. Twelve such categories were defined for the five waste classes of low-level waste (Hess 1994a), as follows: TE

Long-lived low-level waste

(1) Long-lived spent-deionizer resins are low-level waste from purification systems for reactor moderators. They have less than 10 curies of tritium per container and large curie quantities of carbon-14, which has a half-life of 5,730 years.

(2) Other long-lived low-level waste, such as offgas filters from chemical separations areas, contains large quantities of long-lived radionuclides.

Tritiated low-level waste

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(3) Tritiated job-control waste contains tritium in quantities greater than 10 curies per 2.55 cubic meters (90 cubic feet).

(4) Tritiated equipment is large equipment (i.e., too large to be packaged in standard containers) contaminated with tritium in quantities greater than or equal to 10 curies per 2.55 cubic meters (90 cubic feet).

(5) Tritiated soil is contaminated with tritium in quantities greater than or equal to 10 curies per 2.55 cubic meters (90 cubic feet).

Bulk low-level waste

(6) Naval hardware consists of large nuclear-ship-reactor components that are shipped from the Naval Reactors Program to SRS.

(7) Low-activity equipment produces a radiation dose of less than 200 millirem per hour at 5 centimeters (2 inches) from an unshielded container. TE

Low-level waste soils

(8) Suspect soil consists of soils and construction debris excavated from a radiological materials area that is potentially contaminated and that cannot economically be demonstrated to be *uncontaminated.*

(9) Low-activity soil consists of soils and construction debris that produce a radiation dose of less than 200 millirem per hour at 5 centimeters (2 inches) from an unshielded container.

Job-control waste

TE TC (10) Offsite job-control waste is generated by other DOE sites and by nuclear naval operations. It is compacted, containerized, and shipped to SRS for disposal. Job-control waste consists of plastic sheeting, paper, small pieces of wood and metal, glass, gloves, protective clothing, and pieces of small equipment that was used in a radioactive process.

(11) Low-activity job-control waste produces a radiation dose rate of less than 200 millirem per hour at 5 centimeters (2 inches) from an unshielded container and is comprised of job-control waste.

(12) Intermediate-activity job-control waste contains beta or gamma emitters that produce a dose equal to or greater than 200 millirem per hour at 5 centimeters (2 inches) from an unshielded container and is comprised of materials such as contaminated equipment from the separations facilities or waste management facilities, spent lithium-aluminum targets from tritium
TE operations, equipment from F- and H-Area tank farm operations, reactor scrap, and irradiated reactor hardware that does not contain fuel.

Radioactivity in low-level waste generally consists of beta- and gamma-radiation-emitting radionuclides which decay to near-background levels within several hundred years, and therefore pose very small long-term risks to the environment. Alpha-emitting low-level wastes are discussed separately if the alpha-contamination level is sufficient to warrant special handling practices. Low-level wastes with transuranic nuclides at concentrations of 10 to 100 nanocuries per gram, called "alpha waste" in this EIS, are managed in a manner similar to transuranic wastes at SRS and are discussed in the transuranic and alpha waste sections of this EIS. The management of "non-alpha waste" (waste with less than 10 nanocuries per gram of transuranic contamination) is addressed in the low-level waste sections of this EIS.

Waste is classified as **hazardous waste** if it exhibits a characteristic of a hazardous waste (ignitability, corrosivity, reactivity, or toxicity), is identified as such and listed by the U.S. Environmental Protection Agency (EPA) or South Carolina Department of Health and Environmental Control (SCDHEC), is a mixture containing a listed hazardous waste and a solid waste, or is derived from the treatment, storage, or disposal of a listed hazardous waste. Hazardous wastes include materials such as lead, solvents, paints, pesticides, and hydrocarbons. For purposes of analysis in this EIS, hazardous wastes are categorized into the following primary treatability groups: organic liquids, aqueous liquids, organic debris, inorganic debris, heterogeneous debris, metal debris, glass debris, organic sludges, inorganic sludges, and soils. Wastes with unique treatment requirements or specific management practices (e.g., a waste managed in accordance with an approved RCRA variance to land disposal restrictions treatment standards) are categorized separately. Facilities listed in Table 2-2 and waste management, environmental restoration, and decontamination and decommissioning activities generate SRS hazardous waste. Hazardous waste is subject to regulation under RCRA. Polychlorinated biphenyl (PCB) wastes regulated under the Toxic Substances Control Act have been included in the hazardous waste analyses of this EIS.

Mixed low-level radioactive waste contains both hazardous waste subject to regulation under RCRA and low-level radioactive waste subject to the Atomic Energy Act. Mixed low-level radioactive waste includes materials such as tritiated mercury, tritiated oil contaminated with mercury, other mercury-contaminated materials, radioactively contaminated lead shielding, equipment from the tritium facilities in H-Area, and filter paper take-up rolls from the M-Area Liquid Effluent Treatment Facility. TE
Mixed wastes are categorized into the same primary treatability groups as listed above for hazardous wastes. The facilities listed in Table 2-2 and waste management, environmental restoration, and decontamination and decommissioning activities generate SRS mixed low-level radioactive waste. Radioactively contaminated PCBs regulated under the Toxic Substances Control Act are included with mixed waste in this EIS.

Transuranic waste is waste containing alpha-emitting radioactive isotopes of elements above uranium ("transuranic") on the periodic table (atomic number greater than 92) that have half-lives greater than 20 years (several abundant transuranic nuclides have half-lives greater than 10,000 years) at concentrations exceeding 100 nanocuries per gram. Alpha radiation emissions typically have very high energies but low penetrating power. A number of alpha-emitting radionuclides, when inhaled or ingested, are cleared from the body very slowly and can cause substantial radiation exposure to specific TE
organs of the body (e.g., bone surfaces, lungs) over long periods of time. Transuranic waste normally takes a long time to decay to background levels; thus it requires the same sort of long-term isolation as high-level waste. Due to the non-penetrating nature of alpha particles, little or no shielding is required,

but some transuranic waste does require shielding and remote handling when mixed with large quantities of beta-gamma emitting radionuclides. SRS also manages low-level radioactive waste with transuranic radionuclides at concentrations of 10 to 100 nanocuries per gram (called alpha waste at SRS) in a manner similar to transuranic waste. Due to the similarity in their management practices, alpha waste (which consists of low-level and mixed low-level wastes) is discussed in the transuranic waste sections of this EIS. The facilities listed in Table 2-2 and waste management, environmental restoration, and decontamination and decommissioning activities generate transuranic and alpha waste.

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Transuranic and alpha wastes can be segregated into four waste classes based on their treatment, storage, and disposal requirements (Hess 1994a), as follows:

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Low-activity with processing

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(1) Mixed alpha job-control waste is similar to alpha job-control waste but includes hazardous wastes and is, therefore, also subject to RCRA (portions are in the burial ground complex).

(2) Transuranic job-control waste with less than 0.5 curie per drum would be accepted at the Waste Isolation Pilot Plant if it meets waste acceptance criteria.

(3) Mixed transuranic job-control waste with less than 0.5 curie per drum is the same as the third treatability group but contains hazardous waste and is subject to RCRA (portions are in the burial ground complex).

High activity

TE

(4) Transuranic job-control waste with greater than 0.5 curie per drum contains higher concentrations of transuranic isotopes than the third treatability group and would be sent to the Waste Isolation Pilot Plant.

(5) Mixed transuranic job-control waste with greater than 0.5 curie per drum is similar to the fifth treatability group but includes hazardous waste that makes it subject to RCRA (portions are in the burial ground complex).

(6) Transuranic equipment is bulk waste generated primarily by process modifications or decontamination and decommissioning activities that would be sent to the Waste Isolation Pilot Plant. The quantities of transuranic isotopes require special control of airborne contamination, heat load, and criticality. TC

(7) Mixed transuranic equipment is similar to the seventh treatability group but includes hazardous waste.

(8) Remote-handled transuranic and mixed-transuranic is job-control or bulk waste that emits a radiation dose rate greater than 200 millirem per hour at 5 centimeters (2 inches), and requires remote handling to protect workers. This waste would be sent to the Waste Isolation Pilot Plant. TE

Low activity without processing

(9) Alpha job-control waste is generated incidentally to transuranic processes; activity level is too low to warrant disposal in the Waste Isolation Pilot Plant, but the waste does require treatment and disposal. TE

Burial ground complex — Includes 50 percent mixed alpha job-control waste, 40 percent mixed transuranic job-control waste with less than 0.5 curie per drum, and 10 percent mixed transuranic job-control waste with greater than 0.5 curie per drum. TC

In view of the uncertainties in the various factors potentially affecting the amounts of wastes to be generated and managed, DOE developed estimates of amounts of waste for an expected, a minimum, and a maximum waste forecast. A summary of each 30-year forecast, by waste type and year, can be found in Table A-1 of Appendix A. Several refinements have been made to the waste forecasts since the draft EIS was published. In March 1995, DOE published the *SRS Proposed Site Treatment Plan* (WSRC 1995), which included revised estimates of mixed waste generation for the period 1995-1999. The mixed waste forecasts were updated to be consistent with the revisions to the site treatment plan. Table A-2 of Appendix A provides a summary of the forecast revisions that were incorporated in the analyses of the EIS. The net effect of these changes is a slight increase (approximately 4 percent) in the expected amount of mixed waste to be managed over the 30-year period considered in this EIS. TE

2.1.2 TREATABILITY GROUPS

DOE categorized wastes into treatability groups, which are based on waste characteristics that affect how the wastes can be treated. Treatability groups were developed based on three parameters: radiological properties, physical and chemical characteristics, and hazardous constituents. Wastes within a treatability group can generally be treated with similar technologies. Different treatability groups often require different technologies.

2.1.2.1 Radiological Properties

The radiological parameters reflect the level and nature of the radioactivity of the waste and influence the design and operation of facilities in order to limit releases and worker exposures. These parameters are based on the isotopes present (e.g., plutonium-238 versus plutonium-239), the curie content (a measure of the radioactivity of the material), and whether the radiation is penetrating (e.g., beta-gamma) or non-penetrating (e.g., alpha). The radiological categories of waste (as described in Section 2.1.1 and defined by DOE Order 5820.2A, "Radioactive Waste Management") determine treatment, storage, and disposal options. Other radiological parameters include handling requirements (e.g., can be handled directly by workers or must be handled remotely by machine) and transuranic alpha content. Generally, workers can handle most low-level waste without massive or bulky shielding around the waste; however, some form of worker protection may be required. Such wastes are referred to as contact-handled. Containerized wastes producing radiation levels greater than 200 millirem per hour at the surface of the container in the form of beta particles, gamma rays, or both, are usually handled remotely at SRS.

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Transuranic waste typically requires special handling to protect workers from inhaling or ingesting the material and to prevent releases to the environment. Because transuranic isotopes are primarily alpha emitters, external radiation exposure is usually low, and controls focus on preventing the inhalation of alpha particles. Controls also seek to minimize the potential for accidents that could result in airborne releases. Some transuranic wastes emit so much beta and gamma or neutron radiation that they cannot be directly handled. These remote-handled wastes have radiation levels that exceed 200 millirem per hour at the surface of their storage container. In disposing of transuranic waste, the objective is to isolate the waste and allow its radioactivity to diminish. The long half-lives of most transuranic isotopes make permanent isolation in a facility like a geologic repository the only suitable location for disposal.

The most prevalent isotopes in high-level waste are cesium-137 and strontium-90; this waste also contains transuranic isotopes. Because high-level waste contains high concentrations of beta-gamma-radiation-emitting isotopes (50 to 100 curies per gallon) and is in liquid form, controls are directed at radiation shielding, dissipation of the heat produced by the radioactive decay, and containment of the liquid. Due to the high radiation and presence of long-lived transuranic isotopes in high-level wastes, permanent isolation in a geologic repository is required. At SRS, liquid high-level waste is stored in underground steel tanks shielded by concrete and earth. Newer tanks have complete secondary containment and are much less likely to leak into the soil than older tanks with different containment configurations. Although the tanks use multiple leak detection systems, a risk of leaks will remain as long as the waste is in liquid form. High-level waste management is directed at processing the liquid wastes to stable solid forms (i.e., a borosilicate glass form encased in a stainless steel canister) for storage pending the availability of a geologic repository for disposal.

Nuclear processes at SRS generate low-level wastes that are generally packaged in 55-gallon drums or 90-cubic-foot metal boxes. While most low-level wastes contain short-lived radioisotopes, some may present an appreciable radiation hazard. The radiation from low-level wastes may be sufficient to require shielding for worker protection during handling and shipment. However, most low-level wastes will decay over a few hundred years and do not require permanent isolation in the manner required for transuranic and high-level wastes.

Mixed wastes are mixtures of hazardous and high-level, low-level, or transuranic waste components, which require management in accordance with the particular risks presented by the radioactive constituents they contain, as described above, in addition to the risks of their RCRA or Toxic Substances Control Act hazardous constituents. In this EIS, high-level and transuranic mixed wastes are evaluated with the nonhazardous radioactive wastes of those radiation types because the management requirements for these wastes are primarily determined by their radiological properties. The mixed waste category considered in this EIS is limited to low-level non-alpha mixed wastes.

2.1.2.2 Physical and Chemical Characteristics

Since the radioactive constituents account for only a small fraction of the waste volume, the physical and chemical characteristics of a waste determines its overall form. These characteristics affect both regulatory requirements and the applicability of specific treatment technologies. Wastes were grouped for a particular treatment based on the similarity of their physical and chemical characteristics. The three primary categories are liquid waste, solid waste, and unique waste. The liquid and solid categories have particular handling characteristics or requirements by virtue of their physical form. For example, liquids can be pumped via pipelines and are more readily subject to chemical processing (e.g., ion exchange), while solids require conveyor or containerized transfer systems and are processed, if at all, by physical means (e.g., compaction). Each category of unique wastes includes materials that have unique treatment or handling requirements. For example, radioactively contaminated lead is subject to specific RCRA treatment requirements and is categorized as a separate form of solid waste. Similarly, elemental mercury is subject to specific RCRA treatment requirements and is categorized as a separate form of liquid waste.

2.1.2.3 Hazardous Constituents

Hazardous constituents determine the treatment required to manage the hazardous properties of a waste from both a technical and a regulatory perspective. The primary categories are organics; metals; and ignitables, reactives, and corrosives. Organics and metals are classes of contaminants, while ignitability, reactivity, and corrosivity refer to the characteristics that a material may possess.

TE | The type of hazardous constituents will often dictate the regulatory requirements applicable to treating, storing, and disposing of the waste. The principal regulatory programs are RCRA and the Toxic Substances Control Act.

Hazardous wastes are defined and regulated under RCRA. A waste is a hazardous waste if, because of its quantity, concentration, or physical and chemical characteristics, it may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of or otherwise managed.

Materials regulated under the Toxic Substances Control Act include PCBs and asbestos. The presence of these contaminants imposes specific requirements on the management of waste. PCB-contaminated materials are subject to treatment standards that specify more stringent destruction and removal efficiencies than those applicable to hazardous wastes under RCRA. Asbestos is an inhalation hazard and asbestos-bearing materials must be handled and packaged to avoid exposure to asbestos fibers by inhalation. Non-radioactive asbestos is outside the scope of this EIS, but radioactively contaminated asbestos-bearing materials have been included in the waste forecasts. Because asbestos does not generally have specific treatment or disposal requirements, asbestos-bearing materials have not been categorized into separate treatability groups in this EIS.

The technical requirements for waste treatment depend on whether the hazardous constituents can be destroyed (e.g., thermal destruction of an organic contaminant), extracted from the waste (e.g., removal of metal contaminants via ion exchange), or must be immobilized (e.g., stabilization of metal-bearing wastes with a binding agent). A waste can contain more than one constituent; if it does, a series of treatment processes could be required. For example, an ignitable liquid with metal contaminants could be incinerated to eliminate the ignitable fraction; residues from the incineration would then be stabilized to immobilize the metals. For reactive and corrosive materials, treatments such as neutralization can be used to eliminate the hazardous characteristics.

Tables A-3 through A-6 of Appendix A summarize the expected, minimum, and maximum 30-year waste forecast for low-level, hazardous, mixed, and transuranic waste by waste classes and year. Liquid high-level radioactive waste is considered as a single waste class; hence, it is included only in Table A-1 (30-year waste forecast by waste type) of Appendix A. TE

2.1.3 EXPECTED WASTE FORECAST

Thirty-year forecasts (based on fiscal years, not calendar years) of waste at SRS were developed for the types of wastes addressed in this EIS. For each waste type, three forecasts were developed to create an expected, minimum, and maximum estimate of volume. Each forecast is based on wastes generated by the three major activities at SRS: (1) operations, (2) decontamination and decommissioning, and (3) environmental restoration. DOE made assumptions regarding each of these activities to create three potential waste forecasts for analysis. This section presents the amounts of waste that could result from each activity for the expected forecast. Sections 2.1.4 and 2.1.5 describe changes in operations, decontamination and decommissioning, and environmental restoration that would produce the minimum and maximum amounts of waste. TE TE

The expected forecast is based on reasonable assumptions regarding waste generation over the next 30 years. It is assumed that SRS would continue to be a government-owned and contractor-operated facility. It is also assumed that defense material processing and environmental management activities (e.g., disposal and monitoring of waste materials that remain onsite) would continue to be consolidated within the central portion of SRS (Figure 2-2). Surplus defense material facilities located beyond the central portion of SRS would cease to operate and be decontaminated and decommissioned. The expected waste forecast reflects this change in the DOE mission.

The forecast assumes that 658 SRS facilities will be scheduled and funded for decontamination and decommissioning during the 30-year analysis period. *The SRS Decontamination and Decommissioning Program Facilities Plan* (WSRC 1993a) reported these facilities as having some form or combination of radiological, chemical, and/or asbestos contamination. These facilities include the Separations Equipment Development Facility at the Savannah River Technology Center, a tritium manufacturing facility (Building 232-F), the Beta-Gamma Incinerator (Building 230-H), and the Heavy Water Components Test Reactor.

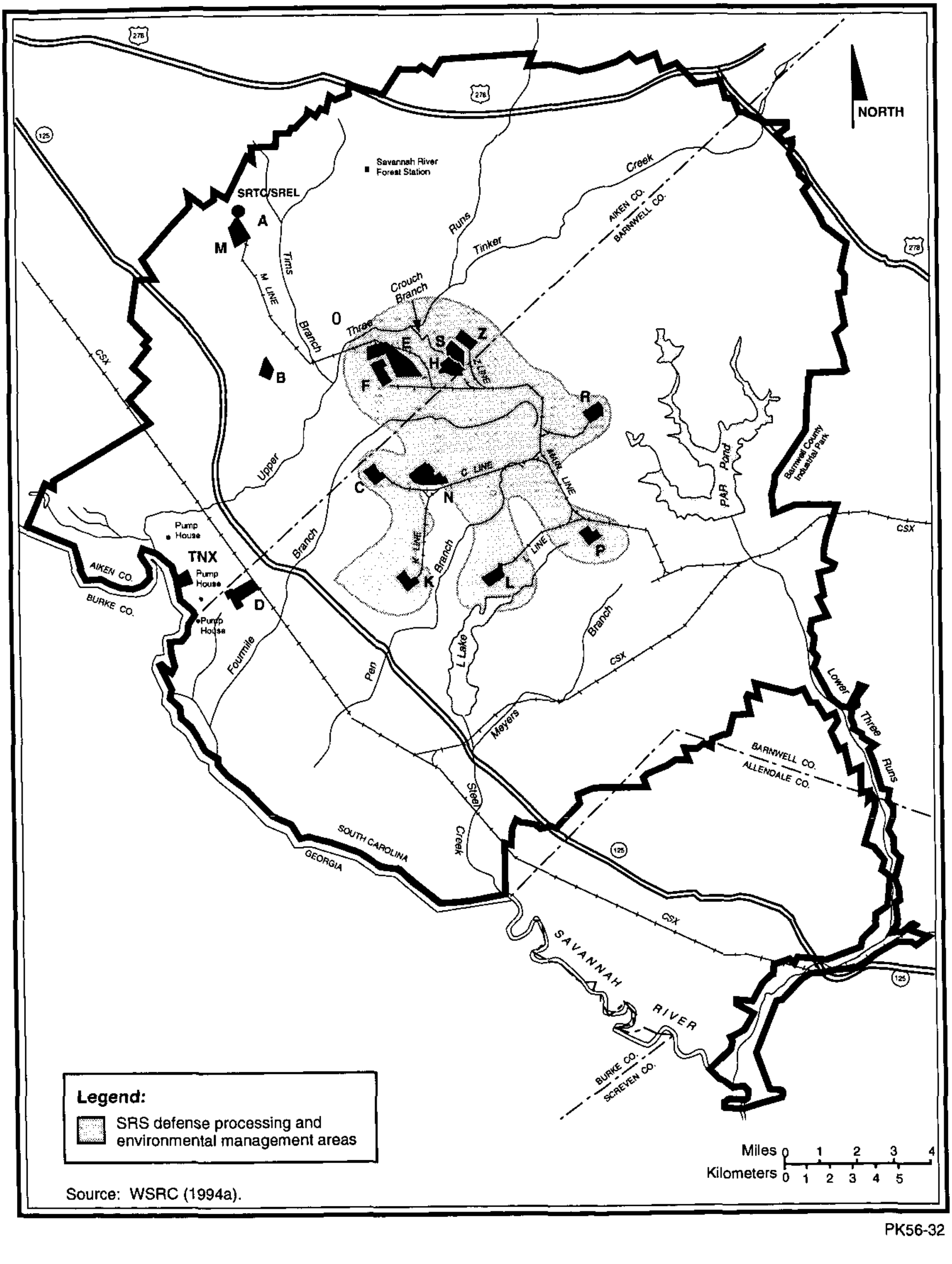

Figure 2-2. The central SRS defense processing and environmental management areas.

Table 2-3 lists the 12 major facilities that are expected to continue to operate beyond 2024 and that, therefore, will not be decontaminated and decommissioned during the analysis period. A list of the SRS facilities that will cease to operate during the forecast period (1995 through 2024) is provided in Table 2-4. The assumptions regarding when these facilities would cease to operate in the expected, minimum, and maximum waste forecasts are included in Table 2-4. TE

Table 2-3. Major SRS facilities that would continue to operate beyond 2024.[a] TE

Facilities	Function
Defense Waste Processing Facility	High-level waste vitrification
Z-Area Saltstone Manufacturing and Disposal Facility	Saltcrete processing and disposal
F/H-Area Effluent Treatment Facility	Treatment of routine process effluent and wastewater
In-Tank Precipitation	Removal of radionuclides from highly radioactive salt solution
Savannah River Technology Center	Research and development activities
Replacement Tritium Facility	Tritium separation from targets
Type III Liquid High-Level Waste Tanks	Storage of liquid high-level waste, sludge, and saltcake
New Special Recovery Facility of 221 FB-Line	Plutonium scrap recovery
484-D Powerhouse Facility	Coal-fired power generation
483-1D Water Treatment Facility and support buildings	Treatment and discharge of powerhouse effluent
Consolidated Incineration Facility (under alternative C would only operate until 2006)	Incineration of specific hazardous and radioactive waste
Analytical Laboratories (excluding Building 772-D)	Analytical services and testing

a. Source: WSRC (1994a).

The forecast assumes that environmental restoration activities would be scheduled for all 129 units identified in Appendixes C and H of the Federal Facility Agreement for SRS (EPA 1993a) and listed in Appendixes G.1 and G.2 of this EIS. The remediation may consist of in-place methods or stabilization and capping, and hence would not result in waste removal. Some form of remediation is also scheduled for a portion of the 303 units identified in Appendix G of the Federal Facility Agreement for SRS (and Appendix G.3 of this EIS). The selection of environmental restoration activities will be made in accordance with the Federal Facility Agreement and its supporting Comprehensive Environmental Response, Compensation and Liability Act and RCRA documents. TE

TE | **Table 2-4.** SRS facilities that will cease to operate under the expected, minimum, and maximum waste forecasts during the analysis period (1995 through 2024).[a]

SRS facility	Function	Expected and minimum case shutdown	Maximum case shutdown
Reactors	Plutonium/tritium production for national defense	1997	1997
D-Area	Heavy-water reprocessing	1997	1997
Reactor Materials (M-Area)	Fuel and target fabrication	1998	1998
Building 772-D	Analytical services and office space	1998	1998
TNX	Research and development testing	1999	1999
H-Canyon	Chemical and physical separation operations for reactor products	2005	2013
HB-Line	Plutonium-238 separation operations	2003	2013
F-Canyon	Chemical and physical separation operations for reactor products	2003	2013
FB-Line	Purified plutonium-solution processing	2003	2013
Receiving Basin for Offsite Fuels/ Resin Regeneration Facility	Storage and packaging of offsite fuels, cleaning targets for processing, and processing deionizers	2005	2013
235-F Plutonium Fabrication Facility (PuFF)	Plutonium-238 oxide fabrication and encapsulation	2013	2013
Thoria Line	Thorium separation operations	2013	2013

a. Source: WSRC (1994a).

The expected waste forecast assumes that waste minimization programs will proceed in accordance with the *Savannah River Site Waste Minimization Plan* (WSRC 1990). DOE does not assume major technological developments that would substantially decrease the waste generation. Other specific assumptions include: TE TE

- Nonradioactive PCB wastes are categorized as hazardous waste and radioactively contaminated PCB wastes as mixed waste.

- Radioactively contaminated oils are categorized as mixed waste, and only half of the radioactively contaminated oil will need RCRA-permitted storage.

2.1.3.1 SRS Operations and Offsite Waste Receipts

The first component of the expected waste forecast is the waste generated by routine SRS operations within the 30-year period of analysis. Individual SRS waste generators provided detailed estimates of their operation's waste generation for a 3-year period (1995 through 1997). The generators also provided a general estimate of waste generation for the next 27 years (1998 through 2024). These long-term estimates are representative of the types and volumes of wastes generated by SRS operations and are based on historical data, anticipated operations, and assumptions about each existing facility. The waste to be managed includes the forecast of waste generation in Appendix A and existing waste in storage, such as liquid high-level wastes stored in the F- and H-Area tank farms, transuranic waste stored on the transuranic waste storage pads, and mixed wastes stored in the mixed waste storage buildings. For this analysis, all facilities are considered to be in a safe inactive status (i.e., liquid waste and chemicals would have been removed, systems flushed and drained, and storage warehouses emptied) before decontamination and decommissioning. Waste volumes associated with reaching a safe storage condition have been included in the operations forecast. Wastes from ongoing environmental restoration operations (investigation-derived wastes such as waters purged from groundwater monitoring wells during sampling) are also included. Wastes generated from decontamination and decommissioning and planned environmental restoration projects are discussed in Sections 2.1.3.2 and 2.1.3.3, respectively. TE TC TC TE

TE Assumptions specific to the operations portion of the expected waste forecast include:

- Secondary waste from the Defense Waste Processing Facility, In-Tank Precipitation, and Extended Sludge Processing operations addressed in the *Final Supplemental Environmental Impact Statement Defense Waste Processing Facility* is accounted for in the operations forecast.

- TC High-level waste volumes are closely aligned with the selected option identified in the Record of Decision for *F-Canyon Plutonium Solutions Environmental Impact Statement* and the *Interim Management of Nuclear Materials at SRS Environmental Impact Statement.*

- High-level waste volumes do not include wastes that may result from future nuclear materials processing decisions, such as concentration/stabilization of plutonium residues or enriched uranium denaturing.

- RCRA regulations would require that some investigation-derived wastes be handled as hazardous waste (less than 20 percent of the soils and mud generated from routine environmental restoration activities).

- Purge water from well sampling would be handled as hazardous waste; however, it is assumed that monitoring well sample volumes could be reduced by 50 percent of current volumes.

- Continued receipt of small amounts (less than 3 percent of the forecast) of low-level waste from other DOE facilities and nuclear naval operations.

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TE The total quantity of waste generated by operations in the expected waste forecast during the next 30 years is approximately 6.03×10^5 cubic meters (2.13×10^7 cubic feet). The percentage that each waste type contributes to the total operations estimate is shown in Figure 2-3. The operations estimate is TC dominated by low-level and liquid high-level wastes. In fact, the operations estimate includes 1.31×10^5 cubic meters (4.63×10^6 cubic feet) of liquid high-level waste already accumulated in storage at the F- and H-Area tank farms. During the 30-year period, about 22,000 cubic meters (7.77×10^5 cubic feet) of additional liquid high-level waste would be generated. Beginning in 1996, when the Defense Waste Processing Facility is scheduled to begin operating, the liquid high-level waste will be reduced through treatment. Low-level, mixed, transuranic, and hazardous wastes will continue to be generated by defense-related operations and waste treatment activities, such as the Defense Waste Processing Facility. After a peak in volume in 1996, the quantity of operations waste would decrease until 2004 due to facility closures (Table 2-4) and then remain constant through 2024.

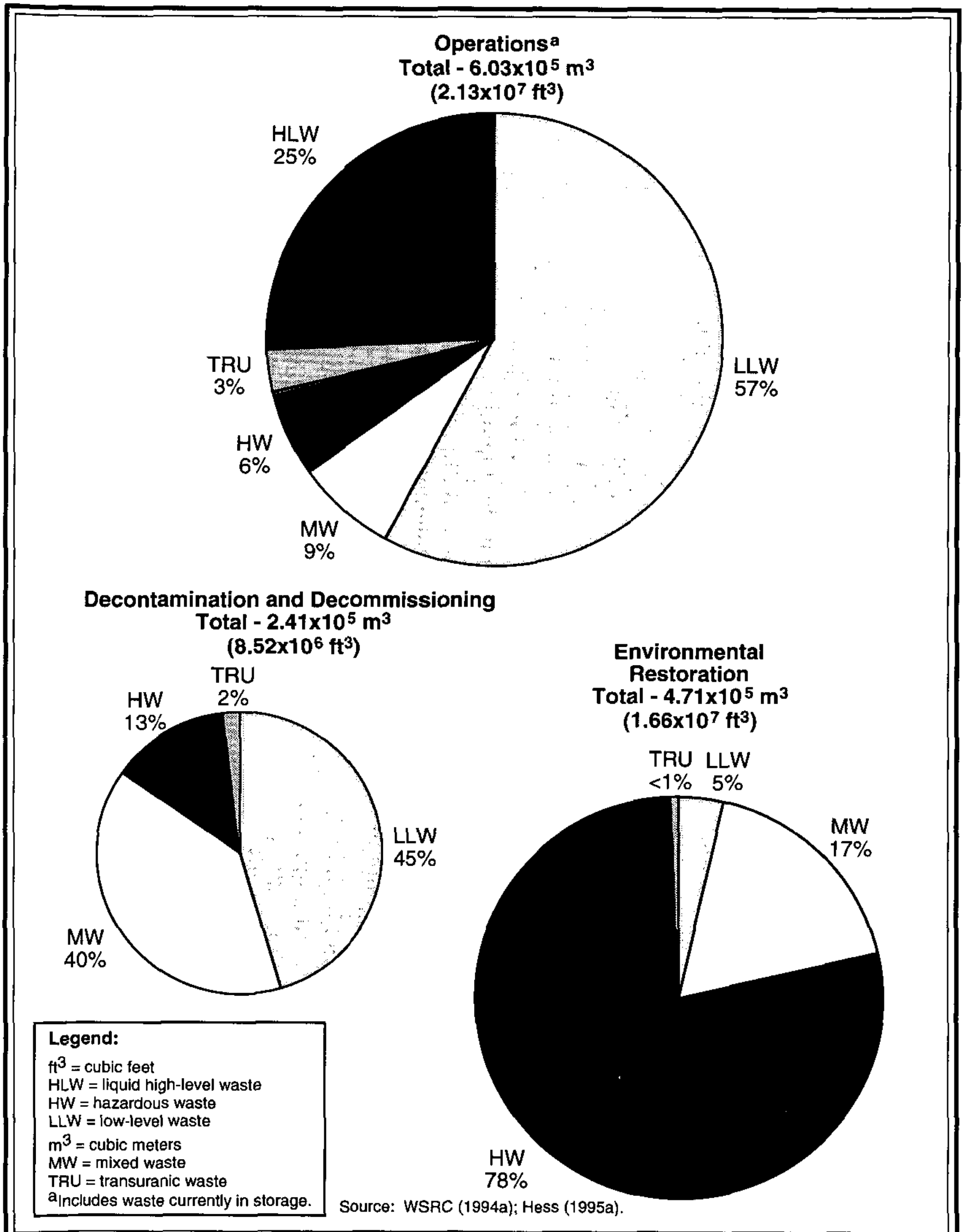

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Figure 2-3. The 30-year expected waste forecast by SRS activity.

Figure 2-4 charts the estimated changes in waste volume from operations, environmental restoration, and TE decontamination and decommissioning in the expected waste forecast during the 30-year period of analysis. *The quantities of operations, environmental restoration, and decontamination and* decommissioning waste fluctuate from year to year, as shown in the forecast, because of the assumptions made about the types of operations, environmental restoration, and decontamination and decommissioning performed and the amount of waste generated in a given year. Detailed plans for these three SRS programs are not known for the entire 30-year period, so estimates of waste generation become less reliable beyond the 5-to-10-year planning window.

2.1.3.2 Decontamination and Decommissioning

TE The second component of the expected waste forecast is the 30-year forecast for waste generated by decontamination and decommissioning. *The Thirty Year Decontamination and Decommissioning Waste Generation Forecast for Facilities at SRS* (WSRC 1994b) was derived from a detailed 5-year forecast of 53 typical SRS facilities scheduled to be decontaminated and decommissioned during the next 5 years (1995 through 1999). The 30-year estimate is an uncertain projection of the 5-year forecast; it estimates the wastes for 658 SRS facilities that are assumed to be scheduled and funded for decontamination and decommissioning during the period covered in this EIS.

TE DOE would decontaminate and decommission facilities as necessary to one of the following cleanup statuses: greenfield, foundation, gutting, or removal. To estimate volumes of waste that would be generated during decontamination and decommissioning, the average waste volume generated per facility was estimated. The volume does not include the sanitary waste that would be generated. The waste volume estimates are based on information extrapolated from the estimates for the first 53 facilities scheduled for decontamination and decommissioning. The range and distribution of sizes of the first 53 facilities were considered to be a reasonable basis for estimating the average size of the remaining 605 facilities. The methods that will be used to decontaminate and decommission facilities to a particular cleanup status at SRS are described in the following paragraphs.

"Greenfield" refers to the removal of the facility, its foundation, and contaminated soil under the foundation. It is estimated that on average 0.6 meter (2 feet) of soil would be removed from beneath a building's foundation. For purposes of the forecast, it was estimated that 15 percent of the removed soil would be contaminated and be transported to a treatment, storage, and disposal facility. The remaining soil would be used as backfill. If more than 15 percent of the soil were contaminated, then remediation TE would be conducted at the facility (in place treatment). The total waste volume generated by

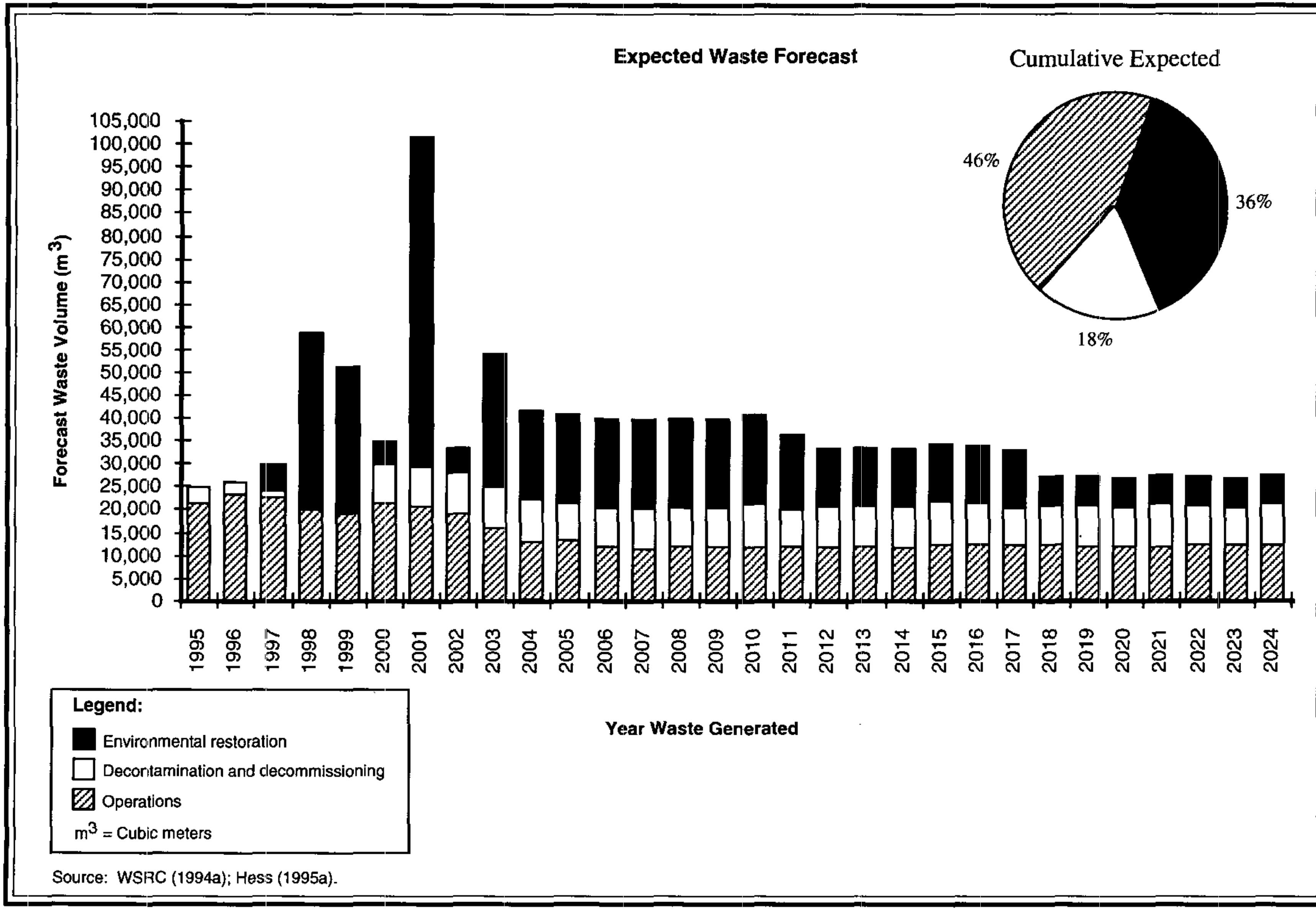

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Figure 2-4. Annual estimates of waste generated by each SRS mission activity for the 30-year expected waste forecast.

decontaminating and decommissioning an average facility to a greenfield state is estimated to be 1,434 cubic meters (50,600 cubic feet).

"Foundation" refers to the removal of the building to its foundation. The foundation and soil would remain in place. The total waste volume generated by decontaminating and decommissioning an average facility to its foundation is estimated to be 717 cubic meters (25,300 cubic feet), 50 percent of the greenfield waste volume.

"Gutting" refers to the removal of materials, equipment, ductwork, and process tanks from the building, and decontaminating the remaining structure. The building could be used for other purposes, such as storage. The total waste volume generated by gutting an average building is estimated to be 179 cubic meters (6,300 cubic feet), 13 percent of the greenfield waste volume.

"Removal" is the elimination of the major sources of contamination (either hazardous or radioactive) such as process equipment or storage tanks that contain product or waste, and decontaminating the remainder of the facility to levels that require only minimum monitoring and maintenance. The total waste volume generated by removal from an average building is estimated to be 90 cubic meters (3,200 cubic feet), 6 percent of the greenfield waste volume.

High-level waste tanks without adequate secondary containment would be stabilized in place. Associated equipment and buildings would be removed. The canyon and reactor buildings would be cleaned, but the buildings would remain in place. The decontamination and decommissioning forecast does not ensure that the volume of wastes will be reduced by volume reduction activities, compaction, treatment, or recycling (i.e., operations activities prior to decontamination and decommissioning). A total of 658 facilities are scheduled to be decontaminated and decommissioned during the next 30 years, pending available funding. The assumptions regarding the level of decontamination and decommissioning required are presented in Table 2-5.

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Table 2-5. Decontamination and decommissioning of facilities during the analysis period resulting in the expected waste forecast (1995 through 2024).

1995 through 1999	2000 through 2024	
	Inside central area	Outside central area
53 to foundation	182 gutted	423 to foundation

Source: WSRC (1994a).

The total quantity of waste forecast from decontamination and decommissioning under the expected waste forecast during the next 30 years is estimated to be 2.41×10^5 cubic meters (8.51×10^6 cubic feet). The percentage of each waste type that contributes to the total decontamination and decommissioning forecast is depicted graphically in Figure 2-3. Based on the forecast assumptions, low-level and mixed wastes would dominate the decontamination and decommissioning forecast for the expected waste forecast.

Figure 2-4 charts the changes in decontamination and decommissioning waste estimates during the 30-year period of analysis. The forecast waste volume would initially be small (1995 through 1999) due to the number of facilities addressed (i.e., 532), and would then increase and remain constant during the years 2000 through 2024 as the remaining 605 facilities are decontaminated and decommissioned. The quantities of decontamination and decommissioning waste fluctuate from year to year in the forecast because of the assumptions made about the number and types of facilities that would be decontaminated and decommissioned in a given year. Liquid high-level waste would not be generated during decontamination and decommissioning. TE

2.1.3.3 Environmental Restoration

The third component of the expected waste forecast is the 30-year estimate for waste generated by environmental restoration. The estimate for environmental restoration was derived from estimates for units (i.e., facilities, spills, miscellaneous) that would undergo restoration during the next 9 years (1995 through 2003). The 9-year waste estimate was averaged over the units undergoing restoration during this period to create an average volume of restoration waste of 3,292 cubic meters (1.16×10^5 cubic feet) per unit. This value was extrapolated to estimate the annual waste volume from environmental restoration for each year. The estimated volume for remediation of each area contaminated by spills would be 10 cubic meters (350 cubic feet) per spill unit. Of the 432 units identified in Appendix G of this EIS, two-thirds are assumed to have no radioactive contamination, and one-third are assumed to be radioactively contaminated. Assumptions were made about the types of waste that would be generated depending on whether a facility was assumed to have or lack radioactive contaminants (i.e., the percentage that would be low-level, mixed, hazardous, or transuranic waste). Large tracts of land that require environmental restoration, such as the Mixed Waste Management Facility in E-Area, would have their wastes treated in place without removal from the waste site, or the units would be capped. The distribution of environmental restoration waste into treatability groups was based on the assessment in the *Thirty-Year Solid Waste Generation Forecast by Treatability Group* (WSRC 1994c). TE

TE The expected waste volumes resulting from environmental restoration activities (Table 2-6) were developed based on the assumptions regarding the various types of units listed in the SRS Federal Facility Agreement (and presented in Appendix G of this EIS).

TE **Table 2-6.** Assumptions from the SRS Federal Facility Agreement that were used to develop forecasts of environmental restoration activities resulting in the expected waste forecast.

Appendixes G.1 and G.2		Appendix G.3 (non-spills)		Appendix G.3 (spills)
Inside central portion of SRS	Outside central portion of SRS	Inside central portion of SRS	Outside central portion of SRS	
7 of 36 units would have wastes removed (19 percent)	93 of 93 units would have wastes removed (100 percent)	No units would have wastes removed	43 of 143 units would have wastes removed (30 percent)	67 of 134 spill units would have wastes removed (50 percent)

Source: WSRC (1994a).

TE The total quantity of waste that would be produced by environmental restoration under the expected waste forecast is estimated to be 4.71×10^5 cubic meters (1.66×10^7 cubic feet). The contribution of each waste type to the total waste is depicted in Figure 2-3. Based on the forecast assumptions, environmental restoration waste would be dominated by hazardous waste.

Figure 2-4 charts the changes in environmental restoration waste during the 30-year period of analysis. The quantities of this waste fluctuate from year to year because of assumptions about environmental restoration activities in a given year. The forecast has four major volume peaks that can be attributed to
TE a few SRS units generating large volumes of waste. These units include: Silverton Road in 1998, the Metal Burning Rubble Pit in 1999, the D-Area Ash Basin and K-Area Sludge Land Application in 2001, and the Par Pond Sludge Application and Par Pond Groundwater Operable Unit in 2003. Liquid high-level wastes would not be generated by environmental restoration.

2.1.4 MINIMUM WASTE FORECAST

TE **2.1.4.1 <u>SRS Operations and Offsite Waste Receipts</u>**

DOE made assumptions regarding projected waste volumes to create a potential minimum forecast for analysis. There are limited changes in the assumed operating status of SRS facilities for this minimum waste forecast. Minimum processing, maintenance, and upgrades would be used to maintain the safety of the liquid high-level waste tank farm facilities. Other assumptions for the minimum waste forecast are the same as for the expected waste forecast.

The minimum forecast assumes that small quantities of additional low-level waste (less than 4 percent of the low-level waste volume) would continue to be received at SRS from other DOE facilities and Naval Reactors Program sites.

Variation between the expected forecast and the minimum forecast for operations would occur because of presumed changes in requirements for handling wastes generated from environmental restoration activities (investigation-derived wastes). The minimum forecast assumes that only 5 percent of the waste (i.e., soil and mud) generated by routine environmental restoration activities would need to be managed as hazardous waste (versus an estimate of slightly less than 20 percent for the expected waste forecast). It was also assumed that purge water from well sampling would be treated as hazardous waste only if its contamination was greater than 10 times the applicable maximum contaminant limits as established by the Safe Drinking Water Act.

The total quantity of the waste from operations under the minimum waste forecast is approximately 5.06×10^5 cubic meters (1.79×10^7 cubic feet). The percentage that each waste type contributes to the total operations, environmental restoration, and decontamination and decommissioning minimum waste forecast is shown in Figure 2-5. The relative percentages of the waste types do not change substantially between the expected and minimum waste forecasts for operations waste. Figure 2-6 charts the estimated changes in the operations, environmental restoration, and decontamination and decommissioning minimum forecast during the 30-year period of analysis. TC

2.1.4.2 Decontamination and Decommissioning

A total of 658 facilities are scheduled to be decontaminated and decommissioned during the 30-year analysis period, pending available funding. The assumptions regarding the state of decontamination and decommissioning required under the minimum waste forecast are presented in Table 2-7. TE

Table 2-7. Decontamination and decommissioning of facilities during the analysis period resulting in the minimum waste forecast (1995 through 2024). TE

1995 through 1999	2000 through 2024	
	Inside central area	Outside central area
53 to foundation	182 by removal	338 gutted 85 to foundation

Source: WSRC (1994a).

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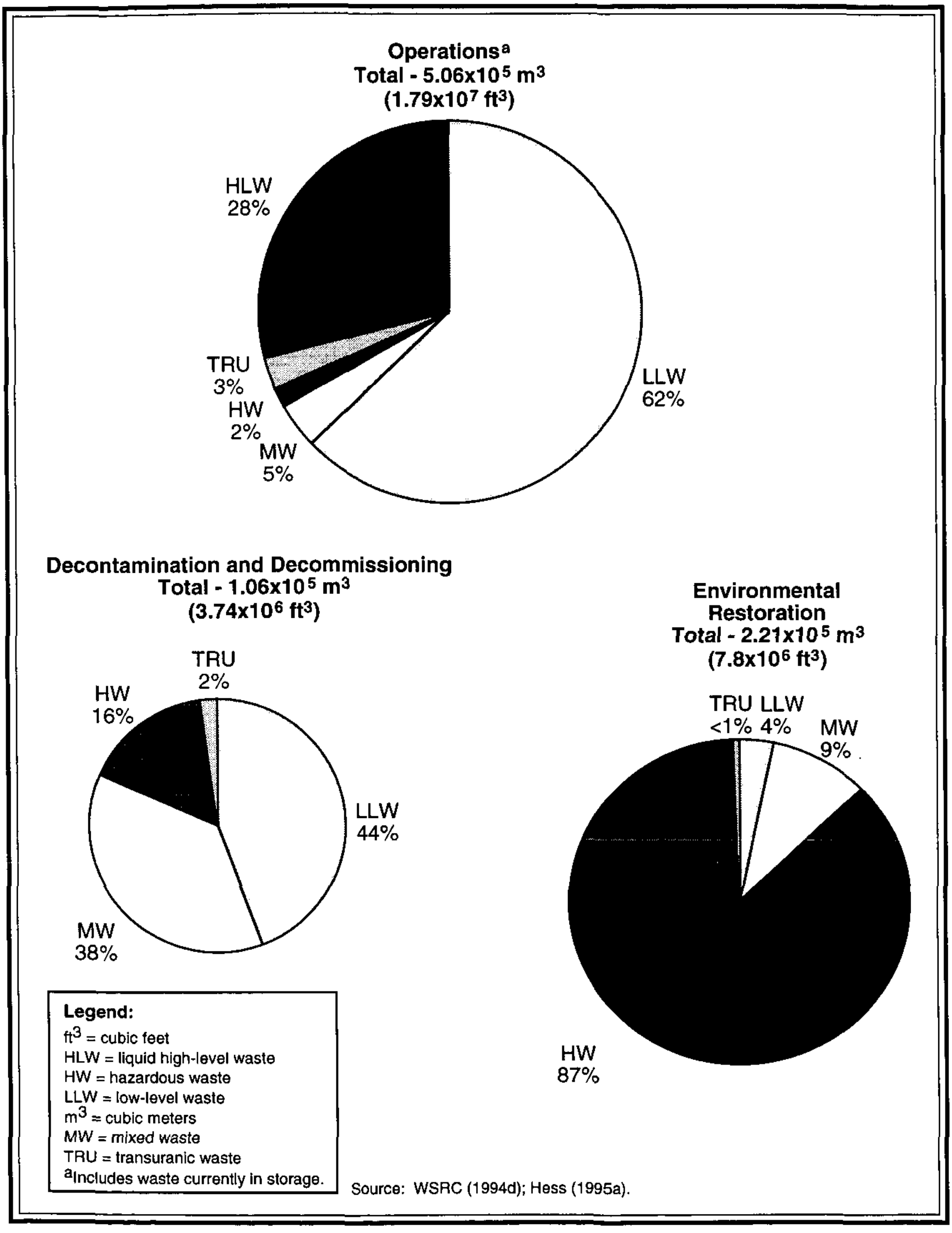

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Figure 2-5. The 30-year minimum waste forecast by SRS activity.

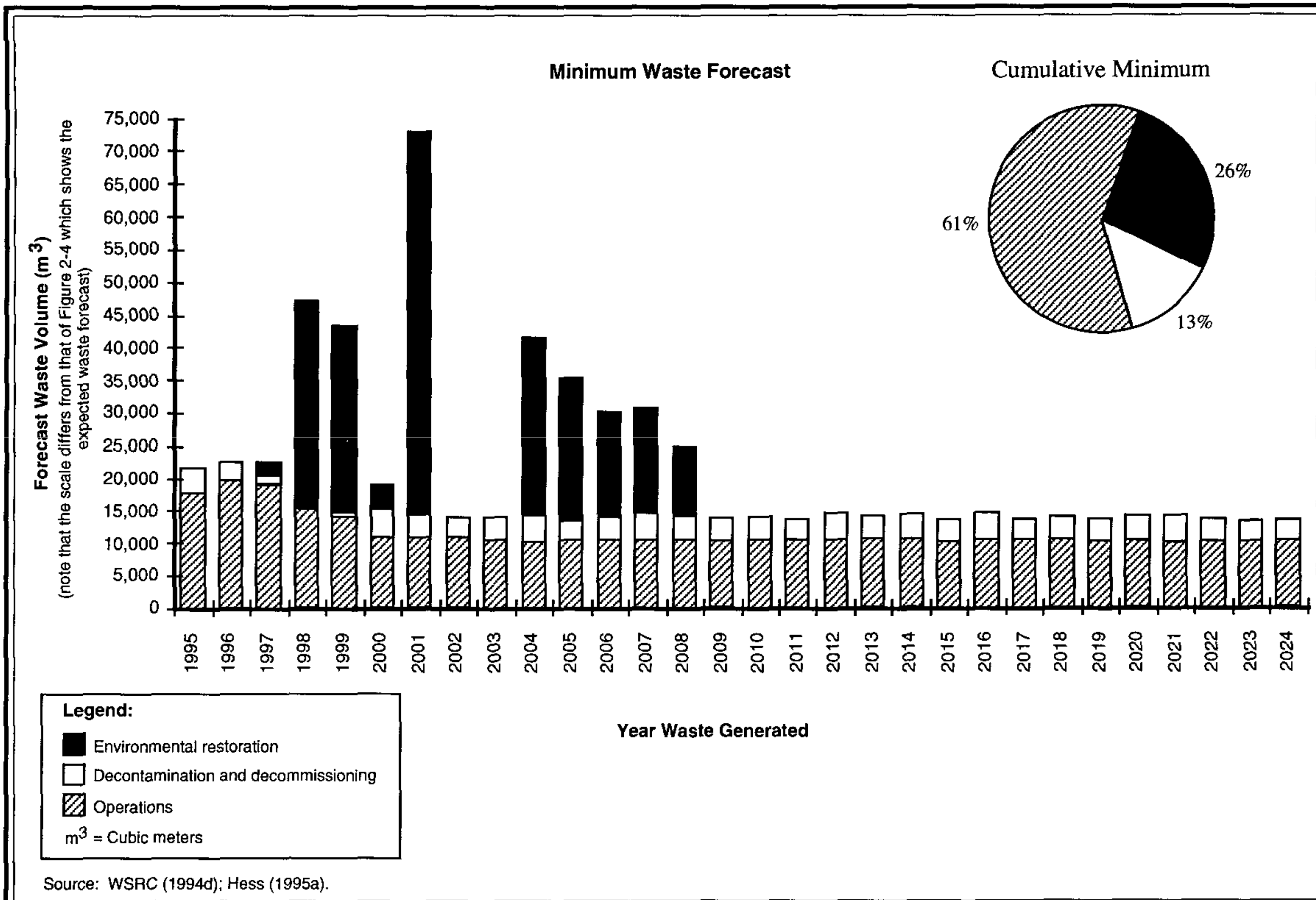

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Figure 2-6. Annual estimates of waste generated by each SRS mission activity for the 30-year minimum waste forecast.

The total waste volume during the next 30 years from decontamination and decommissioning under the
TC minimum waste forecast is expected to be 1.06×10^5 cubic meters (3.74×10^6 cubic feet), less than half the volume of wastes generated by decontamination and decommissioning in the expected waste forecast. The contribution of each waste type to the total decontamination and decommissioning estimate is depicted in Figure 2-5. For decontamination and decommissioning, the relative percentages of the waste
TC types are not substantially different between the expected and minimum waste forecasts. Figure 2-6 charts the estimated changes in the decontamination and decommissioning waste during the 30-year period of analysis.

2.1.4.3 Environmental Restoration

The minimum estimate of wastes resulting from environmental restoration activities (Table 2-8) were developed based on the assumptions regarding the various types of units listed in the SRS Federal Facility Agreement (and presented in Appendix G of this EIS).

TE **Table 2-8.** Assumptions from the SRS Federal Facility Agreement that were used to develop forecasts of environmental restoration activities resulting in the minimum waste forecast.

Appendixes G.1 and G.2		Appendix G.3 (non-spills)		Appendix G.3 (spills)
Inside central portion of SRS	Outside central portion of SRS	Inside central portion of SRS	Outside central portion of SRS	
No units would have wastes removed	23 of 93 units would have wastes removed (25 percent)	No units would have wastes removed	3 of 143 units would have wastes removed (2 percent)	40 of 134 spill units would have wastes removed (30 percent)

Source: WSRC (1994a).

The minimum forecast for environmental restoration during the next 30 years predicts 2.21×10^5 cubic meters (7.8×10^6 cubic feet) of waste, roughly half the volume of environmental restoration waste in the expected case. The contribution of each waste type to the total forecast is shown in Figure 2-5. For environmental restoration, the relative percentages of the waste types do not change substantially
TE between the expected and minimum waste forecasts. Figure 2-6 charts the estimated changes in environmental restoration waste during the 30-year period of analysis.

2.1.5 MAXIMUM WASTE FORECAST

2.1.5.1 SRS Operations and Offsite Waste Receipts

The maximum waste forecast assumes that SRS would be required to manage additional waste due to: (1) changes in the SRS mission or additional nuclear materials processing that would increase the anticipated generation of waste, and (2) a small increase in the receipt of wastes from other DOE facilities. Seven major SRS facilities would continue to operate until 2013 (Table 2-4) and would continue to generate job-control waste. The wastes that DOE assumes it will receive in this forecast are identified in alternatives being considered in other EISs. Sources of increased wastes volumes are: TE TE TE

- Aluminum-clad spent nuclear fuel would come to SRS for processing in accordance with the DOE *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs EIS.* TE

- Plutonium and tritium would come to SRS for recycling between 1995 and 2005 in accordance with DOE's plan to continue to operate the Pantex Plant as described in the *Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components EIS.*

- An additional 6,440 cubic meters (2.27×10^5 cubic feet) of low-level, 1.5 cubic meters (53 cubic feet) of mixed, and 9 cubic meters (320 cubic feet) of hazardous wastes would be generated at SRS from new or expanded DOE operations annually beginning in 2005 and continuing beyond the 30-year analysis period in accordance with the tritium supply and recycling alternatives under the programmatic EIS on reconfiguration of the nuclear weapons complex (now being considered in a separate tritium supply and recycling programmatic EIS). The forecast did not include spent nuclear fuel (approximately 23 cubic meters per year) or liquid low-level wastes (5 million gallons per year) associated with the operation of a potential tritium supply at SRS. TC

- Other wastes from elsewhere in the DOE complex as proposed in the working draft analyses of the *Waste Management Programmatic EIS.* TE

- Low-level waste received from the Naval Reactors Program was assumed to double due to the closure of the Barnwell commercial low-level radioactive waste disposal facility. TE

- Mixed waste from other DOE sites proposed for treatment at SRS in the *SRS Proposed Site Treatment Plan.* TC

It is anticipated that additional transuranic waste containing appreciable quantities of plutonium-238 would come to SRS. SRS was the primary producer of plutonium-238. The maximum forecast assumes the receipt of 127 cubic meters (4,490 cubic feet) per year of mixed plutonium-238 waste from other DOE operations over the 30-year period.

The maximum waste forecast assumes that additional low-level waste (approximately 30 percent of the low-level waste volume) would be received at SRS from other DOE facilities and nuclear naval operations. SRS would also receive limited quantities of mixed waste from other DOE facilities and Naval Reactors Program sites in accordance with the site treatment plan and other evaluations (approximately 3 percent of the mixed waste volume).

Another variation between the expected and maximum waste forecasts for operations is the result of presumed changes in requirements for handling wastes generated by environmental restoration (i.e., investigation-derived wastes). The maximum waste forecast assumes that all waste (i.e., soils and mud) generated by restoration activities would be handled as hazardous waste [versus estimates of less than 20 percent in the expected waste forecast (and 5 percent in the minimum waste forecast)]. Purge water from groundwater monitoring wells would be managed as hazardous waste.

The total quantity of waste from operations in this forecast during the next 30 years is estimated to be 1.43×10^6 cubic meters (5.05×10^7 cubic feet), roughly twice the volume in the expected forecast. The percentage of each waste type that contributes to the total operations forecast is shown in Figure 2-7. The relative percentage of high-level waste decreases and low-level waste increases substantially between the expected and maximum forecasts. Figure 2-8 charts the estimated changes in operations waste during the 30-year period of analysis.

2.1.5.2 Decontamination and Decommissioning

All 423 facilities outside the central portion of SRS scheduled for decontamination and decommissioning between 2000 and 2024 would be cleaned up to greenfield status (compared to foundation status in the expected waste forecast). Facilities within the central portion of SRS would be taken to their foundations (compared to gutted in the expected waste forecast).

A total of 658 facilities are scheduled to be decontaminated and decommissioned during the 30-year analysis period, pending available funding. The assumptions regarding the level of decontamination and decommissioning required under the maximum waste forecast are presented in Table 2-9.

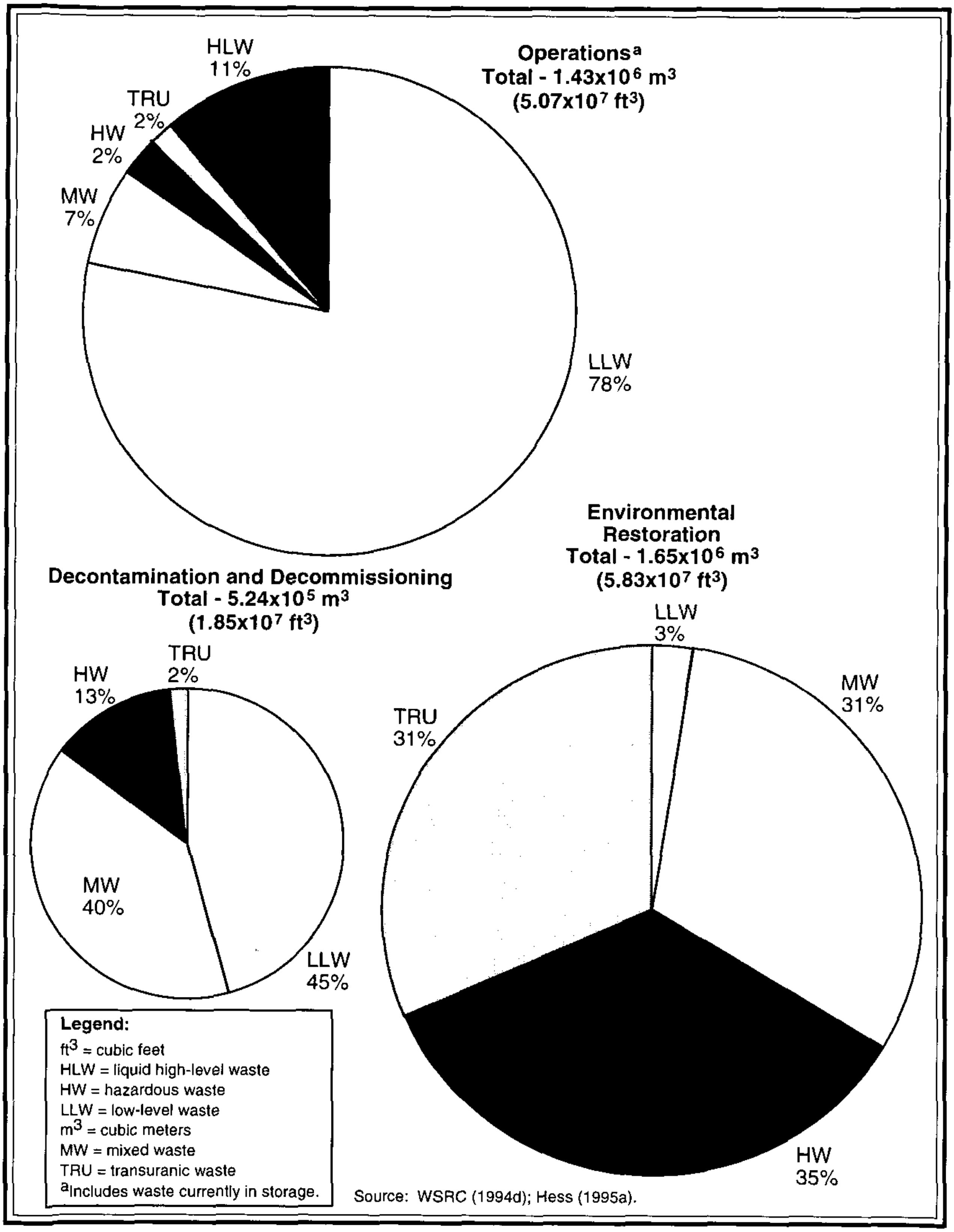

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Figure 2-7. The 30-year maximum waste forecast by SRS activity.

TC
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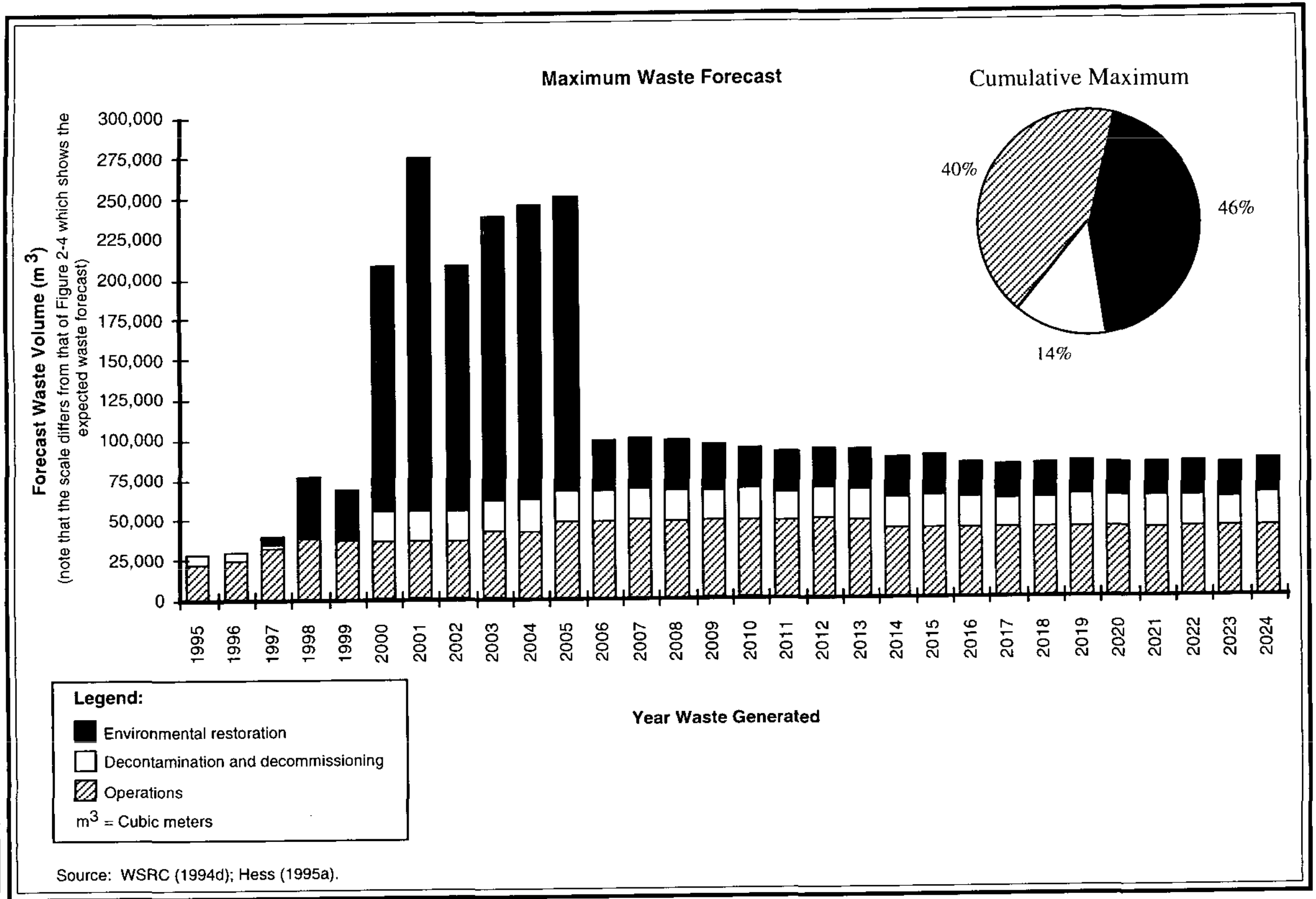

TE

Figure 2-8. Annual estimates of waste generated by each SRS mission activity for the 30-year maximum waste forecast.

Table 2-9. Decontamination and decommissioning level of facilities during the analysis period resulting in the maximum waste forecast (1995 through 2024). TC

1995 through 1999	2000 through 2024	
	Inside central area	Outside central area
53 to foundation	182 to foundation	423 to greenfield

TC

Source: WSRC (1994a).

The total quantity of waste generated by decontamination and decommissioning during the next 30 years in the maximum waste forecast is estimated to be about 5.24×10^5 cubic meters (1.85×10^7 cubic feet), more than twice the volume in the expected waste forecast. The contribution of each waste type to the total forecast is depicted in Figure 2-7. The relative percentages of the waste types do not change substantially between the expected and maximum waste forecasts. Figure 2-8 charts the estimated changes in the decontamination and decommissioning waste during the 30-year period of analysis. TC TC

2.1.5.3 Environmental Restoration

The maximum estimate of waste volumes from environmental restoration (Table 2-10) was based on the assumptions regarding the various types of units listed in the SRS Federal Facility Agreement (and presented in Appendix G of this EIS).

Table 2-10. Assumptions from the SRS Federal Facility Agreement that were used to develop forecasts of environmental restoration activities resulting in the maximum waste forecast. TE

Appendixes G.1 and G.2		Appendix G.3 (Non-spills)		Appendix G.3 (Spills)
Inside central portion of SRS	Outside central portion of SRS	Inside central portion of SRS	Outside central portion of SRS	
36 of 36 units would have wastes removed (100 percent)	93 of 93 units would have wastes removed (100 percent)	No units would have wastes removed	101 of 143 units would have wastes removed (71 percent)	134 of 134 spill units would have wastes removed (100 percent)

Source: WSRC (1994a).

In the central portion of SRS, 20 percent of the Burial Ground Complex in E-Area and 5 percent of the Mixed Waste Management Facility in E-Area would be removed for treatment and disposal. The remainder of the wastes at each of these facilities would be treated in place. As a result of the more intensive forms of environmental remediation (e.g., removal of previously disposed waste), the amount of each waste type would be greater than in the expected waste forecast. TE

TE The total quantity of waste from environmental restoration in the maximum waste forecast during the next 30 years is estimated to be 1.65×10^6 cubic meters (5.83×10^7 cubic feet), roughly three and one-half TE times the volume of the environmental restoration waste in the expected waste forecast. The percentage of each waste type that contributes to the environmental restoration forecast is depicted graphically in Figure 2-7. The relative percentages of transuranic and mixed wastes increase and hazardous waste TE decreases substantially between the expected and maximum waste forecasts. Large volumes of transuranic and mixed waste result from the removal of previously disposed waste in the Burial Ground Complex and Mixed Waste Management Facility during the years 2000 through 2005. The large volume TC of waste is in addition to the waste from those units previously discussed in the expected waste forecast. Figure 2-8 charts the estimated changes in the environmental restoration waste during the 30-year period of analysis.

2.2 No-Action Alternative

This section describes how each waste would be handled under the no-action alternative. For this EIS, the no-action alternative is defined as the continuation of current practices and includes the need to construct additional storage and disposal facilities to manage additional wastes, as has been done in the past.

Section 2.2.1 discusses the current waste minimization program at SRS and its goal of reducing the amounts of waste generated. Waste reduction is an essential aspect of the no-action alternative. The waste minimization program reduces the amounts of liquid high-level radioactive, low-level radioactive, hazardous, mixed, and transuranic wastes and would be applied under each alternative, including the no-action alternative. Sections 2.2.2 through 2.2.6 each describe a specific type of waste and how that waste is handled under the no-action alternative. Section 2.2.7 presents a summary of the treatment, storage, and disposal options applied to each waste type under the no-action alternative. See Acronyms, Abbreviations, Use of Scientific Notation, and Explanation of Number Conversions for a discussion of how numbers were treated. TE

2.2.1 POLLUTION PREVENTION/WASTE MINIMIZATION

2.2.1.1 Introduction

The pollution prevention program at SRS began as isolated efforts to reduce waste. In 1985, DOE developed a hazardous waste minimization plan (Roberts 1985) in response to the Hazardous and Solid Waste Amendments of 1984 (P.L. 98-616). A sitewide approach to waste minimization for each waste type began in 1990 with the development of the *Savannah River Site Waste Minimization Plan*. This more comprehensive approach was required by DOE Order 5400.1, "General Environmental Protection Program." TE

Since 1990, DOE expanded the waste minimization program with a dedicated management group and annual funding of approximately $1 million. The waste minimization program is part of SRS's pollution prevention program under the *Department of Energy, Savannah River Site Waste Minimization and Pollution Prevention Awareness Plan*, FY 1995 (WSRC 1994e).

Waste reduction is achieved through (1) source reduction or (2) recycling. Source reduction decreases or eliminates wastes before their generation and includes recycling within a process, material substitution, process modification, administrative controls, and good housekeeping practices. Recycling is the use, reuse (return of a material to a process as input), or reclamation (recovery of a useful or valuable material) of a material. Waste minimization activities are part of pollution prevention, which also includes energy conservation, source reduction and recycling of wastewater, and source reduction of air emissions.

2.2.1.2 Annual Reductions in the Generation of Waste

Since 1990, DOE has made substantial progress toward reducing wastes generated at SRS. The amounts of all types of waste have decreased since 1991, with the greatest percentage reductions in hazardous and mixed wastes. Reductions in hazardous and mixed wastes were accomplished mainly by material substitution. For example, hazardous solvents used for degreasing have been replaced by nonhazardous ones. Table 2-11 presents the amounts of each waste type generated in 1990 through 1993.

TE **Table 2-11.** Waste generated from 1990 through 1993 (cubic meters).[a,b]

Waste type	1990[c]	1991[c]	1992	1993
High-level	2,400	3,200	1,680	1,560
Low-level	25,480	22,090	12,500	14,200[d]
Hazardous	170	90	100	70
Mixed	NA[e]	33	20	4
Transuranic	760	660	570	390

a. Source: Boyter (1994a).
b. *To convert to cubic feet, multiply by 35.31.*
c. Based on quarterly averages.
d. The 1993 increase in the amount of low-level waste is attributed to environmental restoration activities. However, even though the amount of low-level waste increased, approximately 1,200 cubic meters (42,400 cubic feet) more waste would have been generated if waste minimization
TE activities had not been implemented (Boyter 1994b).
e. NA = not available.

2.2.1.3 Waste Minimization Goals

The current goals for waste minimization are presented in Table 2-12. The goals are reviewed at least annually for appropriateness to SRS's wastes. Progress is tracked and reported quarterly.

A goal for the low-level waste minimization efforts for 1994 was to avoid generating at least 1,870 cubic meters (66,000 cubic feet) of waste. By August 1994, SRS had achieved 50 percent of this goal, eliminating approximately 935 cubic meters (33,000 cubic feet) of low-level waste generation (Stone 1994a).

Table 2-12. Waste minimization goals.[a]

Implement waste minimization activities to avoid generating at least 1,870 cubic meters (66,000 cubic feet) of low-level waste by December 31, 1994.
Reduce generation of high-level, hazardous, mixed, and transuranic wastes by 10 percent of fiscal year 1994 totals by September 30, 1995.
Reduce total releases of toxic chemicals and offsite transfers for treatment and disposal by 50 percent (based on the first year the chemical was reported on a TRI Report[b]) by December 31, 1999.
Reduce the volume of newly generated low-level, hazardous, mixed, and transuranic waste (excluding decontamination and decommissioning and environmental restoration waste) by 50 percent by December 31, 1999.

TE

a. Source: WSRC (1994e).
b. TRI Report = Toxic Release Inventory Report required by the Emergency Planning and Community Right-to-Know Act.

2.2.1.4 Waste Minimization Practices and Initiatives

Major source reduction and recycling practices and initiatives are briefly discussed below and are summarized in Table 2-13.

2.2.1.4.1 Source Reduction

Radiological Controls

SRS currently has more than 0.4 square kilometer (100 acres) of radiological materials areas within which waste is routinely categorized as low-level waste. DOE was able to reduce the size of such areas and thereby reduce the volume of low-level waste. In addition, SRS is implementing, on a trial basis, new waste segregation methods that could further reduce the amount of waste classified as low-level because it was generated in a radiological materials area.

SRS has implemented new radiological control procedures that eliminate some protective clothing requirements in radiological materials areas. In 1993, radiological controls kept approximately 540 cubic meters (19,100 cubic feet) of low-level waste from being generated as a result of changes in

Table 2-13. Waste minimization activities under the no-action alternative.[a]

	Minimization activity	Waste	Annual minimization amount[b,c]
	Implementing new radiological controls (reducing size of radiological materials areas, eliminating protective clothing requirements, using new waste segregation control protocols)	Low-level waste	540
	Using prefabricated radiological control structures	Low-level waste	850[d]
	Substituting for hazardous materials	Hazardous and mixed waste	46[e]
	Offering excess chemicals for reuse	Hazardous waste	5.69×10^4[f,g]
	Modifying process and procedures at F/H-Area Effluent Treatment Facility[h]	Low-level waste	NA[i]
	Modifying process at M-Area Liquid Effluent Treatment Facility[h]	Mixed waste	33[j]
	Reusing lead shielding	Mixed waste	NA
TC	Recycling cadmium-plated filter frames	Mixed waste	100[k]
	Replacing wooden pallets with reusable steel pallets	Low-level waste	370[d]
	Maximizing waste burial container volume	Low-level waste	NA
	Using metal waste as burial containers	Low-level waste	415
	Using "suspect" soils for backfill	Low-level waste	NA
	Recycling spent photographic fixative	Hazardous waste	2
	Recycling scrap lead	Hazardous waste	2.72×10^4[f]
	Recycling refrigerant chlorofluorocarbons	Hazardous waste	NA
	Recycling solvents	Hazardous waste	4
TE	Recycling lead-acid batteries	Hazardous waste	2,670[l]
	Decontaminating tools and equipment	Low-level and mixed waste	NA
TE	Recycling contaminated steel equipment	Low-level waste	6,551[m]

TE | a. Sources: WSRC (1994e); Hess (1995a).
b. Amount given in cubic meters; to convert to cubic feet, multiply by 35.31.
c. Amount given is based on historical waste forecast records, unless otherwise indicated.
d. Projected annual waste reduction amount.
e. Waste reduction from 1992 to 1993, which was due primarily to material substitution. Waste reduction amount exclusively attributable to material substitution not available.
f. Amount given in kilograms; to convert to pounds, multiply by 2.2.
g. Waste minimization amount since 1992.
h. Example of a process improvement.
i. NA = not available.
j. Reduction over a 2-year period.
TC | k. One-time recycling activity.
l. Number of batteries recycled.
m. Amount to be recycled over a 3-year period.

protective clothing requirements and the implementation of these controls (WSRC 1994e). These control procedures include the use of prefabricated radiological containment huts and windbreaks that can be checked for contamination and reused if not contaminated. Prefabricated glove bags were also introduced to eliminate the use and subsequent disposal of special protective clothing. Use of these prefabricated radiological control devices is estimated to reduce low-level waste generation by up to 850 cubic meters (30,000 cubic feet) per year (WSRC 1994e). TC

Material Substitution and Chemical Product Management

Since 1990, SRS has implemented programs to reduce the use of products that generate hazardous or mixed waste by substituting those that do not contain hazardous components and therefore would not produce a hazardous or mixed waste. These substitutions have decreased the amounts of hazardous and mixed waste. Under the new chemical management program, SRS has centralized efforts to find substitutes for products containing hazardous ingredients and to ensure that those substitutes are purchased whenever possible (Stone 1994b). For example, DOE substituted the nonhazardous *Engine Clean* for the hazardous organic solvent *Engine Brite* previously used to clean machine engines; the nonhazardous *Safetap* fluid for the *Rapid Tap* cutting fluid that was up to two-thirds trichloroethylene; and the nonhazardous *Decon-Ahol* for a xylene-based organic solvent called *Magnaflux SKC-HF Spotcheck*, used for cleaning welds during metal fabrication work.

SRS's centralized chemical management uses commodity management. The intent is to use procurement controls to minimize the amount and toxicity of chemicals entering SRS and to minimize the amount of chemicals disposed of as waste by marketing excess chemicals both onsite and offsite (Stone 1994b). Before chemicals are purchased, procurement requests are reviewed by the Chemical Commodity Management Center, excess chemical inventories are checked for the chemicals, and less toxic material substitutions are evaluated.

Chemicals that are no longer needed by the organization that purchased them are designated as excess. Once a chemical is designated as excess, an alternate onsite user is sought. If no onsite user is identified, offsite users are sought. Offsite users are solicited by procurement and through government and school donation programs. Since 1992, the excess chemical program has reduced the amount of hazardous waste disposed of by SRS by approximately 56,900 kilograms (1.25×10^5 pounds) (Larkin 1994; Tuthill 1994; Hess 1994b).

SRS sells used lead-acid batteries to a vendor for recycling. Approximately 1,600 (in 1992), 2,670 (in 1993) (Boyter 1994a), and 550 (through June 1994) (Stone 1994c) batteries have been sold to recyclers.

Miscellaneous Process Improvements

Numerous process improvements have been implemented to reduce waste generation. Process improvements are suggested by employees, imported from other DOE sites, and produced by in-depth studies of processes to evaluate minimization opportunities. Two examples of recent process improvements are:

- Modifications to process piping and procedures at the F/H-Area Effluent Treatment Facility now allow for backflushing of large carbon filter beds. This process improvement at least doubles the life of the filter, reducing the amount of low-level waste generated by the facility (Stone 1994b).

- Disposable filter paper take-up rolls used at the M-Area Liquid Effluent Treatment Facility were replaced with reusable, cleanable filter belts. As a result of this process improvement, 33 cubic meters (1,200 cubic feet) less mixed waste will be generated by the facility over a 2-year period (Stone 1994b).

In-Process Recycling

SRS continues to reuse within its radioactive processes lead shielding that has been contaminated, provided that it is below a certain level of radioactivity. If the shielding is no longer needed in a particular location, it is surveyed for contamination and, if the levels are low enough the lead is reinstalled where needed within the process. Lead that is too contaminated to reuse is considered mixed waste and managed accordingly.

Material and Waste Packaging Improvements

To minimize the amount of waste needing disposal, SRS has reduced material and waste packaging. Materials and equipment are unpacked before entering radiological materials areas so the packaging does not have to be treated as low-level waste. Wooden pallets are being replaced with steel pallets that can be surveyed with more confidence and decontaminated if necessary. Replacing the wooden pallets will result in a low-level waste savings of approximately 370 cubic meters (13,100 cubic feet) in 1994 (Stone 1994b).

Improvements in waste packaging have been implemented to maximize use of disposal containers and save space in disposal facilities. Some low-level waste destined for disposal containers is no longer first packaged in cardboard boxes. Elimination of the cardboard boxes increases the amount of waste that can be packed in each container (Stone 1994b). DOE converted low-level metal materials such as piping into burial containers. Reuse of these metal wastes as burial containers saved approximately 415 cubic meters (14,700 cubic feet) of disposal space in 1993 (Stone 1994b).

In addition to packaging improvements, SRS implemented a program to use soil that is suspected of being contaminated (called "suspect soil"), rather than fresh soil, in waste disposal. Soil that has been removed from a site because of radiological contamination is surveyed for radionuclides and sorted as radioactively contaminated or suspect. Instead of disposing of the suspect soil, SRS uses it as the backfill for the engineered low-level waste trenches where the contaminated soil and other low-level radioactive waste is disposed of (Stone 1994b). TE

2.2.1.4.2 Recycling

SRS reclaims some hazardous wastes onsite, including spent photographic fixative, scrap lead, refrigerant chlorofluorocarbons (Freon®), and paint solvents.

<u>Spent Photographic Fixative</u>

Silver is reclaimed from spent photographic fixative generated by SRS's silk screening and x-ray operations. The silver recovery unit is described in Appendix B.24. Approximately 2 cubic meters (70 cubic feet) and 2.5 cubic meters (88 cubic feet) (Stone 1994c) of spent photographic fixative was recycled in 1993 and through June 1994, respectively. The unit's cartridge filters capture the silver, and the remaining nonhazardous solution is sent to an SRS sanitary treatment facility (Harvey 1994a). When a cartridge filter is filled, it is sent to the U.S. Department of Defense for recovery of the silver.

<u>Scrap Lead</u>

Scrap lead that is not contaminated with radioactivity is recycled at SRS by melting the lead and fabricating it into a useful form. Approximately 9,980 kilograms (22,000 pounds), 27,200 kilograms (60,000 pounds) (Boyter 1994a), and 16,100 kilograms (35,500 pounds) (Stone 1994c) of lead were recycled in 1992, 1993, and through June 1994, respectively. The residue from the lead melting process, a hazardous waste, averages 2,450 kilograms (5,400 pounds) per year (Harvey 1994a). TE

Refrigerant Chlorofluorocarbons (Freon®)

Portable recovery units are used at SRS to recycle chlorofluorocarbons used in refrigeration and air conditioning units. The units are closed-loop systems that allow recovery and reuse of the existing refrigerant without escape to the atmosphere. Information on these recycling units is provided in Appendix B.24.

Solvents

Spent paint solvents from construction operations are distilled in five distillation units at SRS (described in Appendix B.24). Approximately 2 cubic meters (71 cubic feet), 4 cubic meters (140 cubic feet) (Boyter 1994a), and 1 cubic meter (35 cubic feet) (Stone 1994c) of spent paint solvents were recycled in 1992, 1993, and through June 1994, respectively. These amounts represent 100 percent of the spent paint solvent generated by construction operations. Since 1993, the distillation units have yielded approximately 4 cubic meters (140 cubic feet) of reclaimed solvents (Harvey 1994b) for construction projects. Approximately 220 kilograms (480 pounds) of residue is disposed of as hazardous waste per year (Harvey 1994a). In addition to paint solvents, SRS also plans to distill chlorofluorocarbons used as solvents.

Radioactively Contaminated Tools and Equipment

SRS minimizes disposal of radioactively contaminated tools and equipment by collecting them for decontamination and subsequent reuse. Tools are collected and sent to a staging area in C-Area for segregation. Contaminated tools are decontaminated at facilities located in C- or N-Areas. In N-Area, a vacuum stripping process, which is similar to a recycling sandblaster, uses aluminum oxide as the grit. SRS plans to implement carbon dioxide blasting, which is less erosive than vacuum stripping but highly effective, as the main decontamination technology beginning in 1995. Carbon dioxide blasting has no secondary wastes; only the contaminants themselves are left for disposal. In addition, beginning in 1995 a Kelly Decon Machine®, using superheated steam, will clean larger, more intricate equipment (Miller 1994). More information on decontamination technology is presented in Appendix B.24.

Beneficial Reuse Demonstration Program

Recycling opportunities exist for the large amount of scrap metal generated by the decommissioning of equipment. The beneficial reuse program demonstrates the viability of the decontamination of metals to levels where they can be smelted and fabricated into waste containers. This program is proceeding as a demonstration with private firms. This demonstration would convert approximately 54 metric tons (60 short tons) of radioactive scrap metal to waste containers over a 3-year period (Hess 1994b). If it is successful, it could lead to the recycling of large amounts of radioactive scrap metal into waste containers, eliminating the need to dispose of the contaminated metal as low-level waste and the need to obtain an equivalent number of new waste containers (Boettinger 1994a). Approximately 6,600 cubic meters (2.33×10^5 cubic feet) of low-level waste in the form of 68 scrap heat exchangers would be converted to waste containers and beneficially reused (Boettinger 1994b). Other types of contaminated scrap stainless steel would also be available for conversion. TE

Cadmium-Plated Filter Frames

DOE will recycle approximately 100 cubic meters of cadmium-plated high efficiency particulate air filter frames using an offsite vendor. The vendor will remove the filter media from the frames prior to processing the remaining metal. Filter media that are removed will be returned to SRS for disposal as low-level radioactive waste. This will be a one-time recycling activity because all of the cadmium-plated filters have been removed from service and replaced by nonhazardous stainless steel framed filters (WSRC 1995; Blankenhorn 1995). TC

2.2.2 HIGH-LEVEL WASTE

The no-action alternative for liquid high-level waste would continue current management practices. Figure 2-9 shows the management practices for high-level waste from receipt and storage of liquid high-level waste in tanks to preparation and processing into forms suitable for final disposal. As currently planned, liquid high-level waste would be removed from the storage tanks and processed through the Defense Waste Processing Facility into borosilicate glass sealed in stainless steel containers. The major components of this plan have been analyzed separately in the *Final Supplemental Environmental Impact Statement Defense Waste Processing Facility*. The remaining components of the plan, including storage, evaporation, wastewater treatment, and waste removal operations are considered in this EIS. TE TE

TC

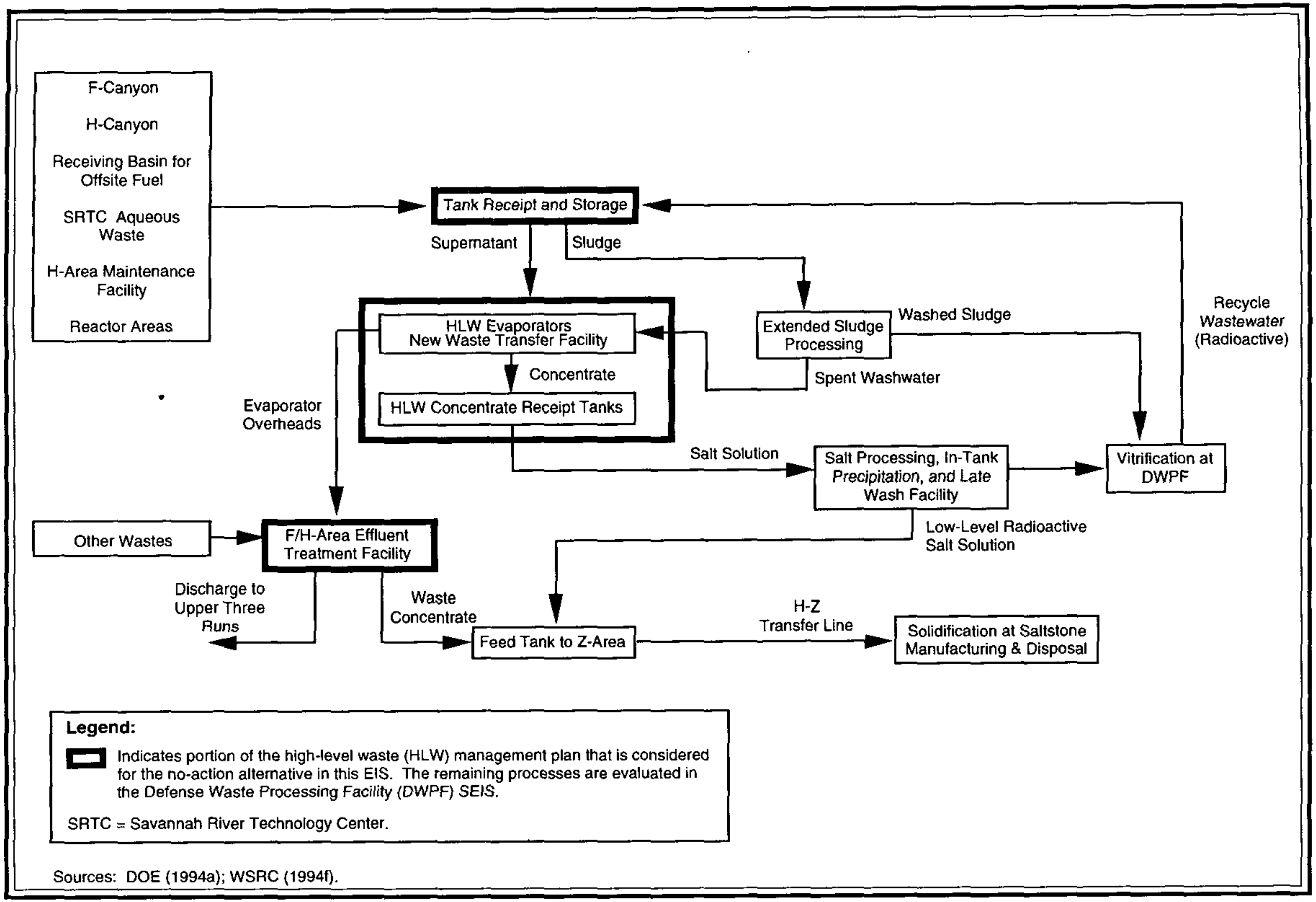

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Figure 2-9. Liquid high-level waste management plan.

Specific management practices for liquid high-level waste included under the no-action alternative are listed below.

- Continue receiving and storing liquid high-level waste in the F- and H-Area tank farms.
- Remove from service tank systems and components that do not have complete secondary containment.
- Continue operating existing evaporators.
- Continue removing waste from tanks and preparing it for treatment in the Defense Waste Processing Facility. | TE
- Continue operating the F/H-Area Effluent Treatment Facility.

In addition, under the no-action alternative, DOE would:

- Continue to construct and then operate the Replacement High-Level Waste Evaporator.
- Implement final construction, startup testing, and operation of the New Waste Transfer Facility.

2.2.2.1 Continue Receiving and Storing of Liquid High-Level Waste in the F- and H-Area Tank Farms | TE

Under the no-action alternative, the tank farms would continue to receive waste from the chemical separations facilities (F- and H-Canyons), the Receiving Basin for Offsite Fuel, the Savannah River Technology Center, the H-Area Maintenance Facility, and reactor areas. Two additional facilities, the Defense Waste Processing Facility and Extended Sludge Processing, are expected to send recycled wastewater to the tank farms during the next 30 years.

The tanks currently contain approximately 1.31×10^5 cubic meters (3.45×10^7 gallons) of high-level waste and are at more than 90 percent of usable capacity (WSRC 1994b, f). Approximately 22,000 cubic meters (5.81×10^6 gallons) of high-level waste would be received in the tank farms during the remaining years of the high-level waste program, which would continue until 2018. According to current operating plans and projected funding, by 2018 DOE expects that the high-level waste at SRS would have been processed into borosilicate glass, and the tanks would be empty (Hess 1994c). This forecast assumes the | TE expected amount of waste would be generated and that current waste management practices and stabilization options being considered for existing site inventories of nuclear materials would continue. Decisions made pursuant to other NEPA analyses could extend the period of waste generation. The effect of additional waste generated by future programs would primarily mean an extended period of waste storage and treatment, not treating larger volumes of waste within the next decade (Hess 1994d).

The no-action alternative assumes that DOE would continue to receive waste from the F- and H-Area separations facilities, store it in tanks with full secondary containment (Type III) in the tank farms (see Appendix B.13), operate the existing evaporators to reduce the volume of waste, complete construction and begin operation of the Replacement High-Level Waste Evaporator, and build no new tanks.

If the tank farms and evaporators operate as projected, tank space can be maintained at acceptable levels (Bignell 1994a). This projection assumes successful startup and operation of In-Tank Precipitation, Extended Sludge Processing, the Replacement High-Level Waste Evaporator, the New Waste Transfer Facility, and the Defense Waste Processing Facility, which are necessary to process the waste into borosilicate glass.

Approximately 3.03×10^4 cubic meters (8.0×10^6 gallons) of liquid high-level waste would continue to be stored in Type I, II, and IV tanks (older tanks with a greater potential for releasing waste into the environment) until waste removal operations were complete (Bignell 1994b). Additional tank capacity is reserved as a contingency in case scheduled surveillances reveal leaks in tanks or if a catastrophic failure were to occur. Should a situation arise that warranted it, alternative storage options, including constructing new tanks, would also be assessed and subjected to appropriate NEPA review. A detailed description of the tank farms is presented in Appendix B.13.

2.2.2.2 Waste Removal

In the Federal Facility Agreement (an agreement between DOE, EPA, and SCDHEC), DOE committed to removing wastes from older tanks that do not meet secondary containment requirements (Tanks 1 through 24). The high-level waste removal operations described in this EIS would comply with the proposed plan and schedule provided under the Agreement. Under the no-action alternative, DOE would continue to remove waste from the older tanks that have the greatest potential for releases to the environment. All tanks would be empty by 2018. Under this alternative, activities would include removal of waste, water washing, and transferring tanks to a decontamination and decommissioning program. Completion of several key activities is necessary before waste removal can begin. These include putting the Replacement High-Level Waste Evaporator into operation, restarting and operating

Extended Sludge Processing, and starting up and operating the New Waste Transfer Facility, In-Tank Precipitation, and the Defense Waste Processing Facility. A detailed discussion of waste removal operations as currently planned is presented under the tank farms facility description in Appendix B.13.

2.2.2.3 Continue Operating Existing High-Level Waste Evaporators | TE

Under the no-action alternative, DOE would continue to operate the 2F and 2H evaporators. The primary goal of operating the two evaporators would be to reduce the current backlog of waste and ensure that there would be at least 1.14×10^4 cubic meters (3.01×10^6 gallons) of available tank space to receive recycled wastewater from the Defense Waste Processing Facility when that facility begins operating and maintain 4,900 cubic meters (1.29×10^6 gallons) of available space that is required to be held in reserve should a tank fail. After the Defense Waste Processing Facility begins operating, the 2F and 2H evaporators could not process waste fast enough to keep pace with the generation of recycled Defense Waste Processing Facility wastewater and other new waste. As a result of this shortfall in evaporation capacity, available space in the tank farms would decrease until the Replacement High-Level Waste Evaporator begins operating (targeted for May 1999) (WSRC 1994f). A detailed discussion of the existing evaporators is presented in Appendix B.13.

2.2.2.4 Continue Operating the F/H-Area Effluent Treatment Facility | TE

Under the no-action alternative, DOE would continue to operate the F/H-Area Effluent Treatment Facility to support high-level waste processing. This facility discharges treated effluents to surface water in accordance with a National Pollutant Discharge Elimination System permit and transfers concentrated waste to the Saltstone Manufacturing and Disposal facility for treatment and disposal. Additional treatment capacity would not be required for the additional wastes from treatment of high-level wastes over the 30-year period. Appendix B.10 describes the F/H-Area Effluent Treatment Facility in detail. | TE

2.2.2.5 Continue Constructing and Begin Operating the Replacement High-Level Waste Evaporator | TE

Under the no-action alternative, DOE would complete construction of and operate the Replacement High-Level Waste Evaporator. A detailed discussion of the capabilities of the Replacement High-Level Waste Evaporator is presented in Appendix B.25. Operation of the Replacement High-Level Waste Evaporator would not be substantially different than operations of the existing high-level waste evaporators. The annual quantity of overheads processed and the characteristics of the materials handled would be similar to those of the existing evaporators.

Based on the 30-year waste forecast, the Replacement High-Level Waste Evaporator or another method of reclaiming tank space is needed to support the long-term operation of DOE's high-level waste program. Without the Replacement High-Level Waste Evaporator, the tank farm would run out of the tank space required for the Defense Waste Processing Facility to recycle wastewater within a few years
TE of its startup (Davis 1994).

TE **2.2.2.6 Complete Construction and Begin Operating the New Waste Transfer Facility**

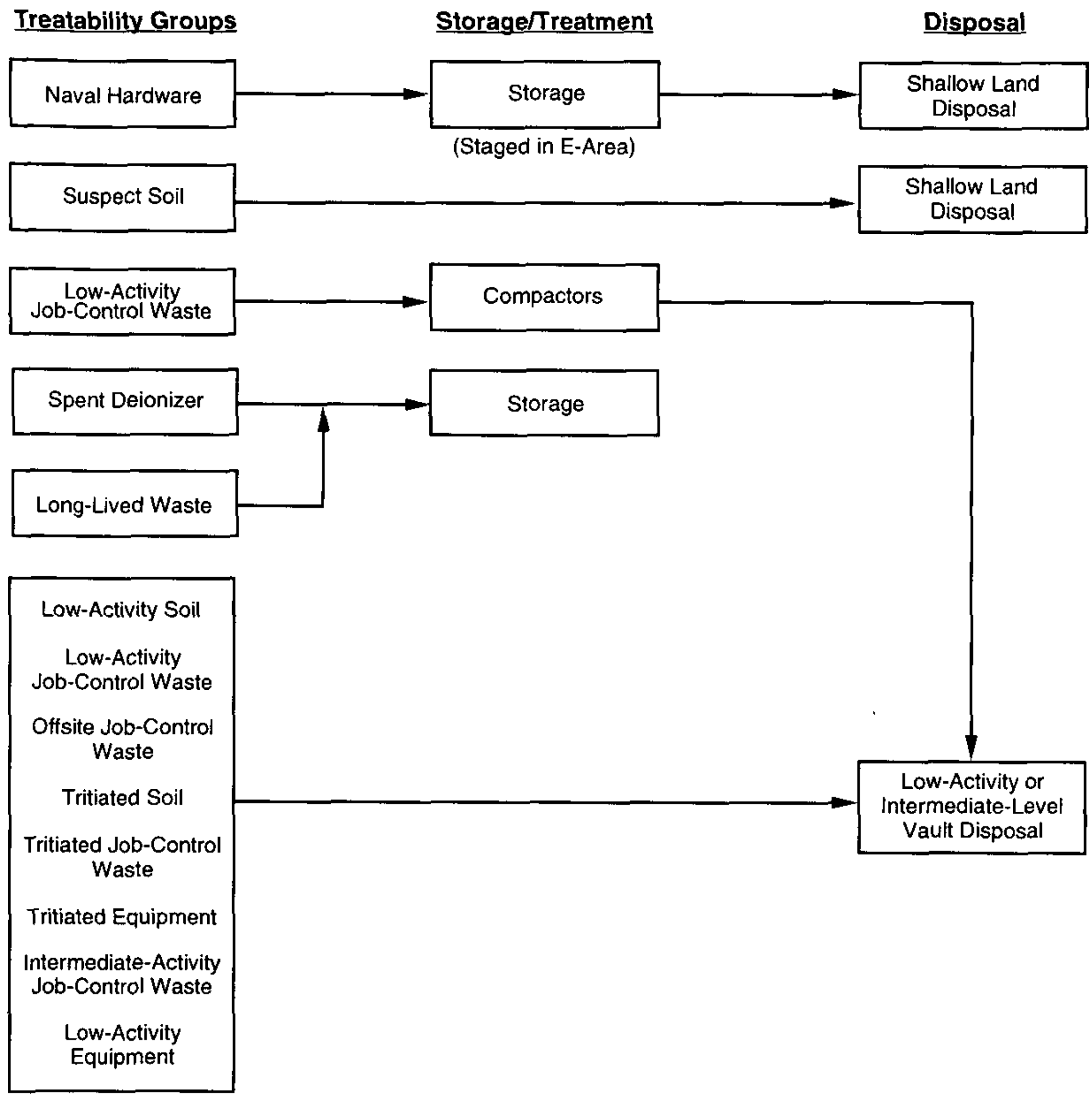
Under the no-action alternative, DOE would complete construction of and operate the New Waste Transfer Facility, which allows transfers between the H-Area tank farm and the Defense Waste
TE Processing Facility. Appendix B.17 presents a detailed description of the facility.

TE The New Waste Transfer Facility was built to replace an old diversion box and would operate in a manner similar to existing pump pits and diversion boxes used for waste transfers in the F- and H-Area tank farms.

2.2.3 LOW-LEVEL WASTE

Under the no-action alternative, DOE would continue management practices for low-level waste that are in effect now and initiate those in current DOE plans (Figure 2-10). At SRS, low-level waste is
TE segregated into several categories to facilitate proper management (see Sections 2.1.1 and 2.1.2). Management practices for low-level waste under the no-action alternative are listed below.

- Continue to compact some low-activity waste to reduce its volume.
- Continue to dispose of low-activity waste in the low-activity waste vaults.
- TC Continue to dispose of suspect soil in the engineered low-level trench until its capacity is reached, then send suspect soil to shallow land disposal in slit trenches.
- Continue to dispose of intermediate-activity waste, both tritiated and nontritiated, in the intermediate-level waste vaults.
- Continue to store long-lived process water deionizers and other long-lived wastes in the long-lived waste storage building.



Source: Hess (1994e).

Note: This figure does not include short-term or transition activities.

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Figure 2-10. Low-level waste management plan for the no-action alternative.

- Continue to store naval hardware on the storage pads in E-Area pending completion of the radiological performance assessment and subsequent shallow land disposal.

TE | DOE Order 5820.2A ("Radioactive Waste Management") establishes performance objectives for the disposal of low-level wastes. A radiological performance assessment is required to ensure that the waste inventory and the proposed disposal method provide reasonable assurance that the performance objectives of DOE Order 5820.2A will be met. The performance objectives list specific dose limits and protect human health. The performance assessment projects the migration of radionuclides from the waste to the environment and estimates the resulting dose to people. DOE completed the radiological performance assessment for the current low-level waste vault design and incorporated the results into the waste acceptance criteria to define maximum radionuclide inventory limits for disposal (Martin Marietta, EG&G, and WSRC 1994). Prior to 1988, DOE disposed of naval hardware by shallow land disposal. Since 1988, DOE has stored naval hardware pending completion of a radiological performance assessment. DOE has also completed a radiological performance assessment for trench disposal of suspect soils as part of the radiological performance assessment for the E-Area vaults. DOE anticipates that naval reactor hardware would also be deemed suitable for shallow land disposal after additional data on the composition and configuration of the waste forms is obtained and can be incorporated in the radiological performance assessment. The long-lived waste storage buildings are designed to provide long-term storage for low-level wastes containing isotopes that exceed the performance criteria for disposal.

For purposes of analysis in this EIS, low-level wastes that are not stabilized prior to disposal (except for suspect soils and naval hardware, as discussed above) would be certified to meet the waste acceptance criteria for disposal in the low-level waste vaults. Stabilized waste forms resulting from the proposed treatment activities would be evaluated against DOE Order 5820.2A performance objectives. Radiological performance assessments for these stabilized low-level wastes (e.g., wastes in which the radionuclides have been immobilized in a cement or glass matrix or encapsulated) are expected to demonstrate that shallow land disposal achieves the objectives. For purposes of analysis in this EIS, it has been assumed that stabilized waste forms would be sent to shallow land disposal. The following sections discuss the treatment, storage, and disposal of low-level wastes under the no-action alternative.

2.2.3.1 Disposal of Low-Activity Waste

Under the no-action alternative, DOE would continue to compact low-activity job control waste to extend disposal capacity. Refer to Appendix B.4 for a description of the compactors. Compactible
TE | low-activity waste in 21-inch cardboard boxes would be placed in steel containers and compacted at one

of two low-level waste compactors. Some compactible low-activity waste in plastic bags would also be placed in 21-inch cardboard boxes and compacted in the L-Area compactor. Low-activity waste that cannot be compacted or does not meet compactor waste acceptance criteria would be placed in steel boxes (WSRC 1993b). Approximately 1.19×10^5 cubic meters (4.20×10^6 cubic feet) (25 percent of the forecast low-level waste) would be compacted over the 30-year analysis period. This waste volume represents the maximum operating capacity of the three existing compactors. TE TC

Containerized low-activity waste was disposed of in engineered low-level trenches in the Low-Level Radioactive Waste Disposal Facility in E-Area until March 31, 1995 (WSRC 1994g). To date, three engineered low-level trenches have been filled. The fourth engineered low-level trench is currently receiving suspect soil only (Hess 1995b). In September 1994, DOE began to use concrete vaults (referred to as the low-activity waste vaults) for disposal of containerized low-activity waste. The same wastes that had been disposed of in the engineered low-level trenches would be disposed of in low-activity waste vaults. One low-activity waste vault has been constructed and additional vaults would be constructed as needed. Refer to Appendix B.8 for a description of the low-activity waste vaults. Operation of low-activity waste vaults would be similar to the engineered low-level trench operation for low-activity waste. TC TC TC TC

The 30-year waste forecast indicates that approximately 4.11×10^5 cubic meters (1.45×10^7 cubic feet) of low-activity waste is expected over the next 30 years. Assuming that the engineered low-level trench would receive suspect soil only and all containerized low-activity waste is being disposed of in a low-activity waste vault, it is expected that the existing vault would reach its capacity by the year 1997. A new vault would need to be constructed every 2 to 4 years for the remainder of the 30-year period, for a total of ten additional vaults (Hess 1995c). TC TC

Under the no-action alternative, DOE would send suspect soil to shallow land disposal (Hess 1994e). See Appendix B.27 for a description of shallow land disposal. Currently, soil that is suspected of being contaminated (suspect soil) is transported to E-Area and used as backfill material in the engineered low-level waste trench, which is expected to be full in early 1995. In this EIS, a slit trench serves as the prototype for future shallow land disposal. It has usable disposal capacity of 1,100 cubic meters (38,800 cubic feet). Based on this capacity, it is estimated that 29 slit trenches would be required to dispose of the forecast 3.0×10^4 cubic meters (1.06×10^6 cubic feet) of suspect soil over the 30-year analysis period (Hess 1995c). TE TC

2.2.3.2 Disposal of Intermediate-Activity Waste

DOE has disposed of intermediate-activity waste in two types of greater confinement disposal facilities, boreholes and engineered trenches, in the Low-Level Radioactive Waste Disposal Facility in E-Area. Existing boreholes have reached capacity and no further borehole construction is anticipated. Refer to
TE Appendix B.27 for a description of greater confinement disposal boreholes and engineered trenches.

DOE disposed of intermediate-activity waste (reactor scrap metal and bulk materials) in the greater confinement disposal engineered trench until March 31, 1995 (WSRC 1994g). The current engineered trench has a capacity of 3,400 cubic meters (1.2×10^5 cubic feet) and is filled to 75 percent of capacity
TC (Hess 1994f). There is 850 cubic meters (30,000 cubic feet) of capacity remaining; however, DOE has no plans to place any additional intermediate-activity waste in the greater confinement disposal engineered trench (Hess 1995b). In February 1995, DOE began to use concrete vaults, referred to as the intermediate-level waste vaults, for disposal of containerized intermediate-activity waste. Refer to Appendix B.8 for a description of intermediate-level waste vaults.

Under the no-action alternative, DOE would dispose of intermediate-activity tritiated and nontritiated wastes in the intermediate-level waste vaults. In the past, separate intermediate-level tritium and nontritium vaults were constructed with tritium vaults having two cells and nontritium vaults having
TE seven cells. In the future, all intermediate-level waste vaults would have nine cells, but intermediate-activity (tritiated and nontritiated) waste would still be segregated for disposal; tritiated and nontritiated waste would be disposed of in separate cells in the same vault (Hess 1994e).

TE The expected waste forecast indicates that 22,000 cubic meters (7.77×10^5 cubic feet) of nontritiated intermediate-activity waste and 6,600 cubic meters (2.33×10^5 cubic feet) of tritiated intermediate-
TC activity waste would be managed over the next 30 years. A small percentage of this waste would be bulk equipment disposed of in slit trenches. The current slit trench has a capacity of 2,700 cubic meters (95,300 cubic feet) and would reach capacity in 1995. Additional slit trenches would be constructed as needed to accommodate bulk equipment that is intermediate-activity waste. However, disposal of bulk intermediate-activity waste in slit trenches would not appreciably decrease the required vault capacity
TE (Hess 1995c).

TC The existing intermediate-level tritium vault would reach capacity by 2000 and the intermediate-level
TE nontritium vault would reach capacity by 1999. DOE would construct intermediate-activity waste disposal capacity equivalent to a nine-cell intermediate-level waste vault approximately every 5 years for
TE the remainder of the 30-year period, for a total of five additional vaults (Hess 1995c).

2.2.3.3 Storage of Long-Lived Waste

Under the no-action alternative, DOE plans to store long-lived waste such as process water deionizers from reactors in long-lived waste storage buildings in E-Area. One storage building has been constructed. Refer to Appendix B.8 for a description of that long-lived waste storage building. DOE would construct additional buildings as needed.

Over the next 30 years, 3,333 cubic meters (1.18×10^5 cubic feet) of long-lived waste is anticipated under the expected waste forecast. Based on this forecast, the current storage building would reach capacity by 2000. DOE would construct a new storage building approximately every year for the remainder of the 30-year period. A total of 24 additional long-lived waste storage buildings would need to be constructed (Hess 1995c). TE

2.2.3.4 Storage of Naval Hardware Waste

Under the no-action alternative, DOE would continue to store naval reactor core barrels and other components from offsite pending demonstration that the waste form meets performance objectives and approval for shallow land disposal. DOE currently stores these materials on gravel pads in E-Area. Refer to Appendix B.27 for a description of naval hardware waste storage pads.

Approximately 1,190 cubic meters (42,000 cubic feet) of naval reactor waste is currently stored at SRS. The current gravel storage pad has a remaining capacity of 174 square meters (1,900 square feet) (Hess 1994f). Capacity to accommodate naval reactor waste would require two additional slit trenches, or equivalent shallow land disposal capacity, during the 30-year analysis period.

Under the no-action alternative, DOE would dispose of approximately 92 percent of low-level waste in low-level waste vaults; 7 percent would be sent to shallow land disposal; less than 1 percent would be stored pending disposal.

2.2.4 HAZARDOUS WASTE

The no-action alternative for hazardous waste as defined in Section 2.1 is to continue waste management practices that are now in effect and to initiate those that are currently planned (Figure 2-11). TE Management practices for hazardous waste under the no-action alternative are listed below.

- Continue to receive and store hazardous waste in six existing storage facilities.
- Continue to treat and dispose of hazardous waste offsite.
- Continue to treat and dispose of PCB waste offsite.
- Continue to collect hazardous waste for recycling or resale.
- Continue to treat aqueous liquids generated from groundwater monitoring well operations (investigation-derived wastes) in the M-Area Air Stripper.

DOE would continue to store hazardous waste in three storage buildings that have RCRA permits and on TE three solid waste storage pads with RCRA interim status. (Refer to Glossary for the definition of interim status.) The hazardous waste storage buildings and storage pads located in B- and N-Areas are collectively known as the Hazardous Waste Storage Facility and are used to store wastes generated at TE various sites across SRS (WSRC 1993c).

Both hazardous and mixed wastes generated in M-Area are currently stored in a building in M-Area; that TE practice would continue (WSRC 1994h). Hazardous wastes that are currently stored in the Hazardous Waste Storage Facility or the M-Area storage building would continue to be stored until they are transported offsite for treatment and disposal. Because DOE would continue to send hazardous waste offsite for treatment and disposal as it is generated, the existing Hazardous Waste Storage Facility and M-Area storage building would provide sufficient short-term storage capacity over the next 30 years.

In addition to hazardous wastes that are stored until they are sent for offsite treatment and disposal, DOE currently accumulates several types of hazardous wastes for recycling on- and offsite. Under the no-action alternative, these recycling practices (described in Section 2.2.1) would continue.

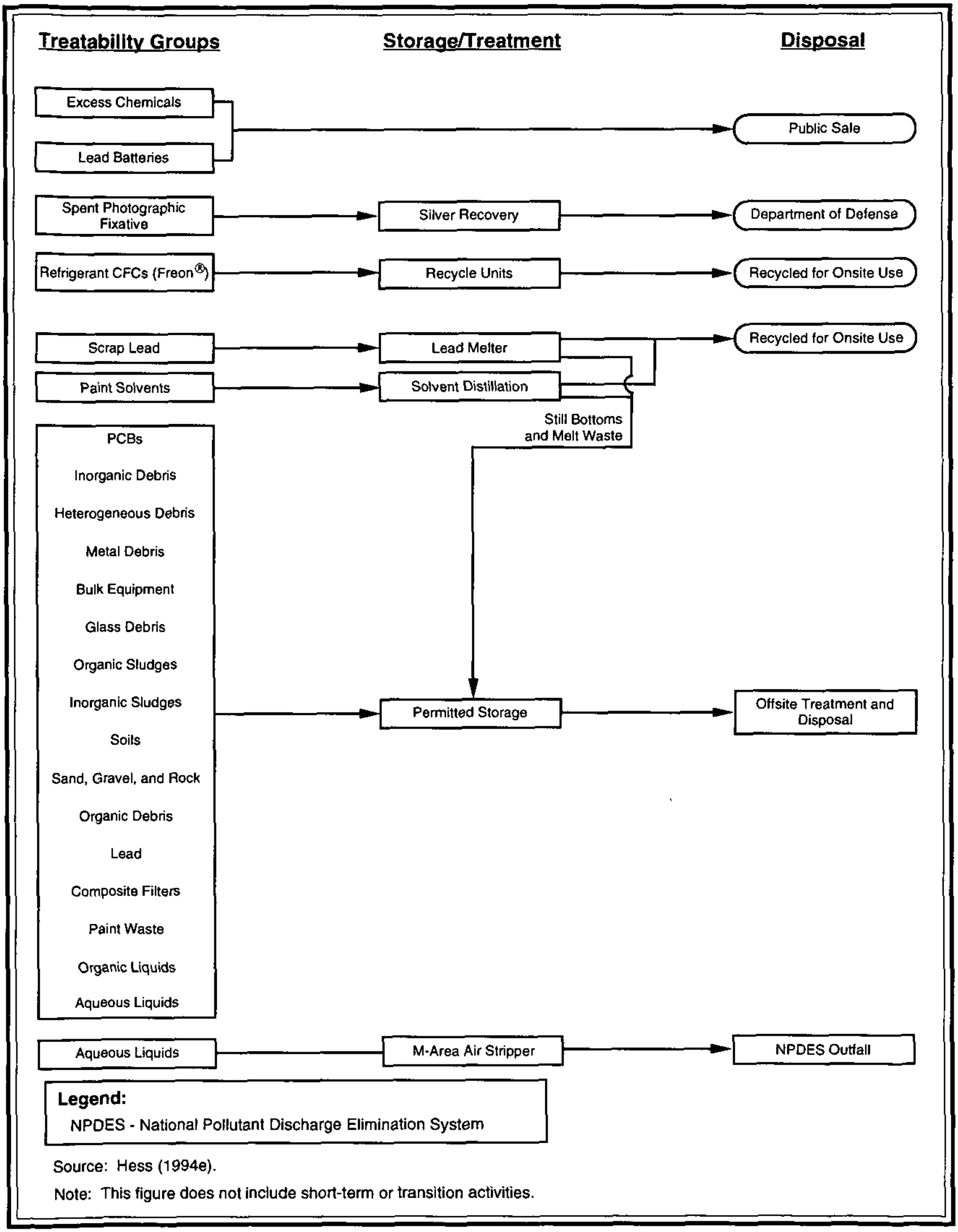

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Figure 2-11. Hazardous waste management plan for the no-action alternative.

DOE would continue to treat hazardous aqueous liquids collected from groundwater monitoring wells (investigation-derived wastes) in the M-Area Air Stripper. Once treated, the liquids would be discharged to an outfall in accordance with National Pollutant Discharge Elimination System criteria. Because DOE would continue to treat and discharge these liquids, additional storage capacity would not be necessary for these aqueous wastes over the next 30 years.

2.2.5 MIXED WASTE

Management practices under the no-action alternative for mixed waste (which includes radioactively contaminated PCB wastes regulated under the Toxic Substances Control Act and nonhazardous radioactive oil) are listed below and shown in Figure 2-12.

- Continue to receive and store mixed waste in existing storage buildings, existing tanks, and on existing storage pads.
- Continue to receive, store, and treat by an ion exchange process the aqueous mixed waste in existing storage tanks at the Savannah River Technology Center.
- Continue to receive and store mixed waste (PUREX solutions) in the existing solvent storage tanks in E-Area until these tanks are replaced with new tanks in H-Area and solvent wastes are transferred to new tanks.
- Continue to store mixed waste in tanks at the M-Area Process Waste Interim Treatment/Storage Facility.
- Store benzene in the Defense Waste Processing Facility Organic Waste Storage Tank.
- Continue to store low-level PCB wastes until they are shipped offsite for treatment of the PCB waste fraction.
- Continue to accumulate radioactive oil at individual sites throughout SRS where it is generated.

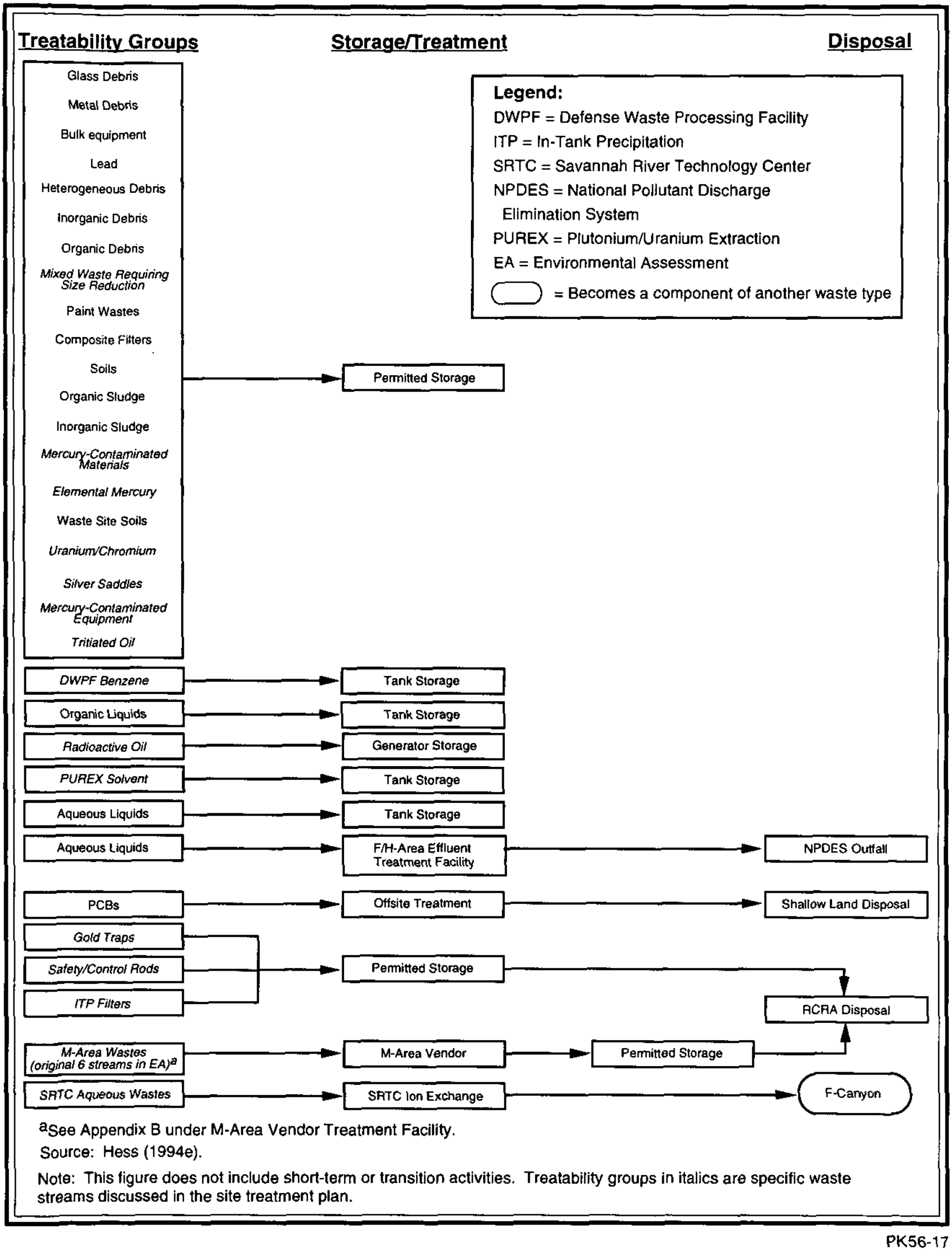

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Figure 2-12. Mixed waste management plan for the no-action alternative.

- Continue to treat aqueous liquids collected from groundwater monitoring well operations (investigation-derived waste) in the F/H-Area Effluent Treatment Facility.

- Treat filters generated at In-Tank Precipitation by acid leaching and placement in specially designed boxes that meet disposal criteria in accordance with the EPA-approved treatability variance.

Management practices for mixed waste in the no-action alternative would consist of implementing the following activities.

- Construct and operate the M-Area Vendor Treatment Facility for vitrification of certain wastes generated by M-Area electroplating operations.

- Receive and store mixed waste in the most recently constructed mixed waste storage building (which has not been used to date).

- Construct additional mixed waste storage buildings as necessary to meet the demand for mixed waste storage.

- Dispose of mixed waste in the planned RCRA-permitted disposal vaults that will be constructed once the permit is approved.

- Continue constructing the Consolidated Incineration Facility.

- Construct additional Defense Waste Processing Facility organic waste storage tanks as necessary to meet the demand for benzene storage.

- Dispose of residuals returned from the treatment of radioactive PCBs by shallow land disposal.

- Receive and store organic and aqueous liquid waste in planned storage tanks, with additional tanks constructed as necessary.

2.2.5.1 Containerized Storage

Under the no-action alternative, DOE would continue to store mixed waste in four mixed waste storage buildings and on three mixed waste storage pads. One storage building has a RCRA permit, while permits for the remaining facilities have been applied for and the buildings are operating under interim status. The existing storage facilities would reach capacity in 1998. DOE would have only limited capacity to treat mixed waste under the no-action alternative; therefore, approximately 1.84×10^5 cubic meters (6.50×10^6 cubic feet) of containerized mixed waste would be placed in RCRA-permitted storage over the next 30 years if waste generation proceeds as expected. To accommodate future storage needs, DOE would construct additional storage buildings as needed. The most recently constructed storage building, Building 643-43E, serves as the prototype for additional storage buildings in this analysis. It has usable capacity of 619 cubic meters (21,900 cubic feet). Based on this capacity, it is estimated that 291 additional buildings would be needed over the next 30 years to accommodate the expected amounts of mixed waste (Hess 1995c). TC TC

DOE would continue to store low-level PCB wastes in one of the mixed waste storage buildings. DOE is completing arrangements to treat the PCB component of this waste at a commercial facility. Once treated, the residuals would be returned to SRS for shallow land disposal. Refer to Section 2.2.7.3 for projections of low-level waste disposal capacity over the next 30 years.

DOE would continue to generate radioactive oil and store it in containers in the areas where it is generated. Radioactive oil is not a mixed waste, so there are no RCRA requirements for its storage (i.e., it does not need to be stored in a permitted storage facility); it can continue to be stored wherever it is generated. For this reason, there would be sufficient storage capacity for the next 30 years.

2.2.5.2 Treatment and Tank Storage

Under the no-action alternative, DOE would continue to receive, store, and treat aqueous wastes at the Savannah River Technology Center. Because DOE treats the waste as it is generated, tank capacity would not be exceeded and additional tanks would not be required.

DOE would continue constructing the Consolidated Incineration Facility, which is expected to be completed by September 1995 (Crook 1995). TE

The 568-cubic-meter (150,000-gallon) interim status Organic Waste Storage Tank would be used under the no-action alternative for storing mixed organic waste generated at the Defense Waste Processing Facility. Based on the expected waste forecast, the tank's storage capacity would be reached in approximately 5 years. The no-action alternative assumes that the Consolidated Incineration Facility does not operate. Thus, DOE would need to build four additional organic waste storage tanks similar to TE TE TC the existing tank to accommodate mixed organic waste generated at the Defense Waste Processing Facility over the 30-year period (Hess 1995c).

Under the no-action alternative, two of the 95-cubic-meter (25,000-gallon) solvent tanks in E-Area would continue to be used for mixed waste until October 1996 when these tanks reach the end of their service life (WSRC 1994i). Replacement tanks would be required to extend storage capacity. Currently, DOE plans to construct four 114-cubic-meter (30,000-gallon) solvent tanks in H-Area to replace these
TE | tanks (WSRC 1993d). Based on the expected waste forecast, these solvent tanks would provide sufficient storage capacity (Hess 1995c).

Under the no-action alternative, DOE would also need to construct two additional 114-cubic-meter (30,000-gallon) storage tanks in E-Area in 1995, one for aqueous liquid waste and one for organic waste. These tanks would be similar to solvent storage tanks proposed for H-Area. DOE would add new tanks as needed to accommodate expected aqueous and organic liquid waste over the next 30 years. DOE
TC | estimates that 43 aqueous waste and 26 organic waste storage tanks would be needed under the no-action alternative.

Under the no-action alternative, the tanks at the M-Area Process Waste Interim Treatment/Storage Facility would continue to store concentrated mixed wastes from the M-Area Liquid Effluent Treatment
TE | Facility. DOE plans to treat six kinds of M-Area wastes (identified in Appendix B.15) stored in the Process Waste Interim Treatment/Storage Facility tanks and the M-Area storage building by vitrification in the M-Area Vendor Treatment Facility. The potential effects of vitrifying these wastes were considered in an environmental assessment (DOE 1994b); a Finding of No Significant Impact was issued in August 1994. Additional storage capacity would not be required, and the existing tanks would be used
TE | for feed preparation and to transfer offgas -scrubber -blowdown (exhaust residue) waste from the vitrification process to the M-Area Liquid Effluent Treatment Facility. DOE submitted an application for a wastewater treatment permit to SCDHEC for the M-Area Vendor Treatment Facility. DOE plans to place the vitrified waste in containers and store it on a storage pad in M-Area until RCRA-permitted disposal capacity becomes available (see Section 2.2.5.3). DOE has submitted a RCRA permit application requesting interim status for this storage pad. Additionally, DOE plans to petition EPA to have the vitrified waste delisted as a RCRA hazardous waste. If the delisting petition is successful, DOE would then be able to dispose of these wastes as a low-level waste.

Under the no-action alternative, DOE would continue to treat aqueous liquids collected from groundwater monitoring wells in the F/H-Area Effluent Treatment Facility. Once treated, the liquids would be discharged to an outfall in accordance with the facility's National Pollutant Discharge Elimination System permit.

DOE submitted a petition for a land disposal restrictions treatability variance for the filters used at In-Tank Precipitation (WSRC 1991). The petition requested that DOE be allowed to treat the filters by acid leaching followed by placement in specially designed containers. EPA approved this variance on October 1, 1993 (EPA 1993b). Under the no-action alternative, DOE would treat In-Tank Precipitation filters by the method prescribed in the treatability variance. After treatment, the In-Tank Precipitation filters in their containers may be temporarily stored on waste storage pads prior to RCRA-permitted disposal (see Section 2.2.5.3). A similar treatment and disposal method would be used for the Defense Waste Processing Facility late-wash filters, which are similar to the In-Tank Precipitation filters. TE

2.2.5.3 Disposal

DOE submitted an application to SCDHEC for a RCRA permit to construct 10 Hazardous Waste/Mixed Waste Disposal Vaults. A radiological performance assessment will be prepared to determine the performance of the Hazardous Waste/Mixed Waste Disposal Vault design and establish waste acceptance criteria defining the maximum radionuclide inventory limits for disposal. Based on the results from the radiological performance assessment, DOE may determine that alternative disposal methods meeting the RCRA specifications would also achieve the performance objectives of DOE Order 5820.2A for certain SRS mixed wastes. It is anticipated that mixed wastes that are not stabilized prior to disposal may require disposal in the RCRA-permitted disposal vaults. Stabilized waste forms resulting from the proposed treatment activities would be evaluated against the DOE Order 5820.2A performance objectives. Radiological performance assessments for these stabilized wastes (e.g., wastes in which the radionuclides have been immobilized in a cement or glass matrix or encapsulated) are expected to demonstrate that shallow land disposal, in facilities conforming to RCRA design requirements, achieves the performance objectives.

For purposes of analysis in this EIS, RCRA-permitted disposal capacity has been based on the current design of the Hazardous Waste/Mixed Waste Disposal Vault. Under the no-action alternative, RCRA-permitted disposal capacity would be used only for the disposal of mixed waste. Mixed waste that would be sent to RCRA-permitted disposal includes vitrified waste from the M-Area Vendor Treatment Facility, gold traps, safety/control rods, In-Tank Precipitation filters, and Defense Waste Processing Facility late-wash filters. Since all hazardous wastes are sent offsite for treatment, storage, or disposal under the no-action alternative, RCRA-permitted disposal capacity would not be needed for the disposal of hazardous waste treatment residuals. Due to the limited amount of treatment conducted under the no-action alternative, a single vault would be sufficient to meet SRS RCRA-permitted disposal capacity requirements.

2.2.6 TRANSURANIC AND ALPHA WASTE

Under the no-action alternative, DOE would perform activities required to achieve regulatory compliance for alpha and transuranic waste storage. The no-action alternative would continue the transuranic and alpha waste management practices now in effect or currently planned, as follows (Figure 2-13):

- Store transuranic and alpha waste on transuranic waste storage pads.
- Retrieve the drums of transuranic waste stored in earthen mounds on Transuranic Waste Storage Pads 2 through 6.
- Assay containers at the Experimental Transuranic Waste Assay Facility/Waste Certification Facility following upgrades to the facility.
- Construct additional storage facilities (new transuranic waste storage pads) to accommodate the projected waste volumes.
- Dispose of newly generated nonmixed alpha waste in the low-activity waste vaults.

2.2.6.1 <u>Storage</u>

The waste generators would handle and package transuranic and alpha wastes in accordance with existing administrative procedures. In the draft EIS, DOE proposed to continue to store all alpha waste (10 to 100 nanocuries per gram). However, to reduce the amount of additional storage capacity required, DOE will now use the low-activity waste vaults for disposal of alpha waste that can be certified to comply with the vaults' waste acceptance criteria. Under the no-action alternative, DOE would manage newly generated nonmixed alpha waste by segregating these materials and certifying the waste for disposal in the low-activity waste vaults. The existing inventory of nonmixed alpha waste and all mixed alpha waste would be managed in the same manner as the transuranic waste (greater than 100 nanocuries per gram). Waste containers would be placed on the existing transuranic waste storage pads. Appendix B.30 describes these waste storage pads and how the wastes are handled.

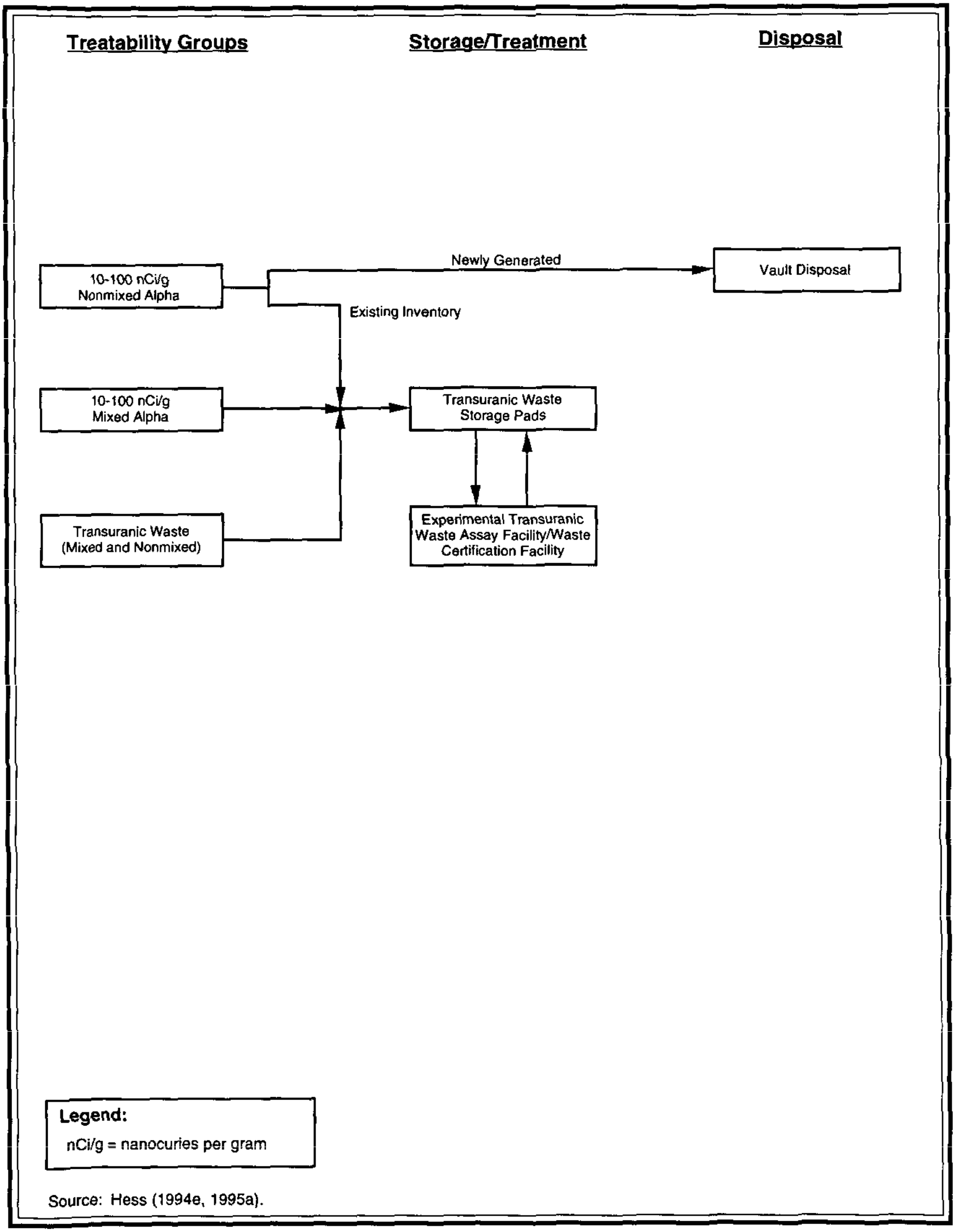

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Figure 2-13. Transuranic waste management plan for the no-action alternative.

DOE has committed to SCDHEC to rearrange the wastes stored on Transuranic Waste Storage Pads 14 through 17 by 1998. Under the no-action alternative, DOE would implement a transuranic, alpha, and low-level mixed waste storage strategy to maximize the capacity of the transuranic waste storage pads. For purposes of analysis in this EIS, it is assumed that the low-level non-alpha mixed waste currently stored on Transuranic Waste Storage Pads 7 through 13 would be removed and placed on Waste Storage Pads 20 through 22. Transuranic Waste Storage Pads 18 and 19 would be used for mixed transuranic waste storage. DOE would retrieve the wastes on Transuranic Waste Storage Pads 2 through 6 from mounded storage because they are about to reach the limit of their original 20-year retrievable life. DOE would not disturb the transuranic containers on Transuranic Waste Storage Pad 1 because the waste is inside concrete culverts, which are expected to provide adequate storage for the next 30 years. DOE would rearrange the transuranic and alpha waste stored on Transuranic Waste Storage Pads 2 through 13 to maximize the container storage capacity. Large steel boxes and culverts would be placed on pads without covers. Drums on the covered pads 14 through 17 would be stacked three high in rows with aisles between them to provide the ability to inspect containers (WSRC 1994j).

TC As part of DOE's storage strategy for the transuranic waste storage pads, DOE would consider the R- and P-Reactor Areas as well as other locations to determine if they could provide suitable alternative storage so that additional transuranic waste storage pads would be unnecessary (WSRC 1994j).

DOE plans a retrieval project to safely recover the drums from the earthen mounds over Transuranic Waste Storage Pads 2 through 6, overpack them in larger drums, and restore them in a safe configuration on the transuranic waste storage pads. The overpacked drums would have an activated carbon filter vent TE to prevent gas accumulation. The project would begin in 1997 or 1998. Appendix B.30 provides a detailed description of the retrieval project (WSRC 1994j).

As part of the no-action alternative for transuranic waste, the existing Experimental Transuranic Waste Assay Facility/Waste Certification Facility would require minor upgrades and would assay and x-ray TC drums of transuranic and alpha waste to verify packaging and content. The facility, which is not currently operating, was designed to assay transuranic waste (greater than 100 nanocuries per gram) for certification in accordance with Revision 3 of the Waste Isolation Pilot Plant waste acceptance criteria. TE Appendix B.9 describes in detail the Experimental Transuranic Waste Assay Facility/Waste Certification Facility.

Additional storage space would be required under the no-action alternative to accommodate transuranic and alpha wastes. The current volume of stored transuranic and alpha waste represents 44 percent of the 30-year transuranic waste forecast. Based on the waste forecast, DOE would need to construct

19 additional transuranic and alpha waste storage pads during the 30-year analysis period. The first pad would be needed in 1998 (Hess 1995c). DOE would model the transuranic waste storage pads after existing Transuranic Waste Storage Pads 14 through 17 and locate the pads within E-Area. TC TE

2.2.6.2 Disposal

DOE would dispose of newly generated nonmixed alpha wastes (approximately 5-percent of the forecast waste) in the low-activity waste vaults. This disposal would reduce the amount of additional storage capacity required under the no-action alternative by the equivalent of 3 storage pads (Hess 1995c). Refer to Section 2.2.7 for projections of low-activity vault disposal capacity over the 30-year period. TC

2.2.7 SUMMARY OF THE NO-ACTION ALTERNATIVE FOR ALL WASTE TYPES

The siting of the proposed waste treatment, storage, and disposal facilities in this EIS was conducted on two levels. The first level identified the most likely candidate site based on its proximity to major SRS waste generating operations and the existing and planned waste management facilities. The second level evaluated the available land within that site to identify specific areas suitable for development that would comply with applicable regulations and minimize the impacts to ecological resources, archaeological resources, and threatened and endangered species. The following discussion explains the rationale by which candidate sites were selected for the proposed facilities evaluated in this EIS (Ucak and Noller 1990). TE TC

DOE proposes to consolidate several waste processing facilities in a waste treatment complex. The close proximity of the facilities would allow sharing of some equipment and infrastructure. Utilities such as water, process steam, and electrical supplies, and emergency response capabilities such as stand-by power supplies, spill cleanup equipment and personnel, and supplies of water for fighting fires could be shared to eliminate redundancies and provide economies of scale. In addition, secondary waste treatment (such as wastewater treatment capacity) could be provided to meet the needs of facilities located in the waste treatment complex. TE TE

Potential siting of the waste treatment complex involved identifying candidate sites based on their proximity to the existing waste treatment, storage, and disposal facilities and to the waste generators. The siting evaluation then considered additional criteria including the available acreage, possibility of acquiring SRS site use approval (permission to use the site for waste management facilities in lieu of other potential uses for the same location), and topography. The available acreage needs to be sufficient to accommodate current needs and future growth. Site topography was evaluated for engineering TE preparation, drainage, and forest clearing requirements.

TE The 600-acre site north and west of F-Area was selected on the basis of its close proximity to existing SRS facilities and infrastructure and because surveys had determined that it had no archaeological resources or threatened and endangered species (Ucak and Noller 1990). E-Area includes the past and current SRS waste disposal facilities and is anticipated to remain under DOE control. Contaminated soils and groundwater associated with past disposal activities in this area are being addressed under the environmental restoration program.

By siting the facilities in E-Area as close as possible to existing facilities that are currently generating the waste, DOE would minimize the potential exposure to workers and the general public. Most of the SRS TC waste is in E-, F-, and H-Areas. Siting new facilities close to these areas would minimize the potential for an accident and for occupational exposure by reducing the distances that wastes would be transported and limiting most of the transportation to dedicated roadways. E-Area is centrally located within SRS; hence, conducting activities there minimizes exposure to the general public. The roads and railroads serving this location have already been constructed and the area contains approximately 70 acres of land that has been previously cleared, graded, stabilized, and fenced. This area is large enough to construct facilities to manage most of the waste volume under the expected waste forecast.

TE RCRA regulations that govern site selection for hazardous and mixed waste management facilities include restrictions relating to seismic considerations, floodplains, and recharge zones (40 CFR 264.18). SCDHEC has promulgated Hazardous Waste Management Location Standards (R.61-104) pursuant to the South Carolina Hazardous Waste Management Act that impose additional restrictions on the siting of hazardous and mixed waste management facilities at SRS. DOE must demonstrate compliance with the siting standards under RCRA and R.61-104 as part of the permitting process for hazardous and mixed waste management facilities. DOE has submitted a location standards compliance demonstration for the Hazardous Waste/Mixed Waste Disposal Vaults for SCDHEC's review and approval. The 600-acre site north and west of F-Area has also been considered in two other SRS location standards compliance demonstrations.

TE In selecting sites for the facilities, every effort was made to avoid wetlands, sensitive species, steep slopes, exceptional wildlife habitat, established forest, and archaeological sites. In some instances this could not be done. Some 70-year-old upland hardwood sites would be required to provide sites for sediment catchment basins and stormwater management ponds downslope from the facilities. Some facilities would be placed in 60- to 70-year-old longleaf pine stands and would result in the loss of the habitat and those species currently inhabiting those sites.

Under the no-action alternative, which continues current practices to manage waste, DOE would:

- Continue waste minimization activities as described in Section 2.2.1.
- Continue receiving and storing liquid high-level waste in the F- and H-Area tank farms.
- Remove from service tank systems and components that do not have complete secondary containment.
- Continue operating existing evaporators.
- Continue removing high-level waste from tanks and preparing it for treatment in the Defense Waste Processing Facility. TE
- Continue operating the F/H-Area Effluent Treatment Facility.
- Continue to construct and then operate the Replacement High-Level Waste Evaporator.
- Implement final construction, startup testing, and operation of the New Waste Transfer Facility.
- Continue to dispose of suspect soils in the engineered low-level trench until its capacity is reached, then send suspect soil to shallow land disposal in slit trenches. TC
- Continue to compact some low-activity waste to reduce its volume.
- Continue to dispose of low-activity waste in the low-activity waste vaults. TC
- Continue to dispose of intermediate-activity waste, both tritiated and nontritiated, in the intermediate-level waste vaults.
- Continue to store long-lived process water deionizers and other long-lived wastes in the long-lived waste storage building.

- Continue to store naval hardware on the storage pads in E-Area pending completion of the radiological performance assessment and subsequent shallow land disposal.

- Continue to receive and store hazardous waste in six existing storage facilities.

- Continue to treat and dispose of hazardous waste offsite.

- Continue to treat and dispose of PCB waste offsite.

- Continue to collect hazardous waste for recycling or resale.

- Continue to treat hazardous aqueous liquids generated from groundwater monitoring well operations (investigation-derived wastes) in the M-Area Air Stripper.

- Continue to receive and store mixed waste in existing storage buildings, existing tanks, and on existing storage pads.

- Continue to receive, store, and treat by an ion exchange process the aqueous mixed waste in existing storage tanks at the Savannah River Technology Center.

- Continue to receive and store mixed waste (PUREX solutions) in the existing solvent storage tanks in E-Area until the tanks are replaced with new tanks in H-Area and solvent wastes are transferred to the new tanks.

- Continue to store mixed waste in tanks at the M-Area Process Waste Interim Treatment/Storage Facility.

- Store benzene in the Defense Waste Processing Facility Organic Waste Storage Tank.

- Continue to store low-level PCB wastes until they are shipped offsite for treatment of the PCB waste fraction. Dispose of residuals returned from the treatment of radioactive PCBs by shallow land disposal.

- Continue to accumulate radioactive oil at the individual sites throughout SRS where it is generated.

- Continue to treat mixed waste aqueous liquids collected from groundwater monitoring well operations (investigation-derived waste) in the F/H-Area Effluent Treatment Facility.
- Treat filters generated at In-Tank Precipitation by acid leaching and placement in specially designed boxes that meet disposal criteria in accordance with the EPA-approved treatability variance.
- Construct and operate the M-Area Vendor Treatment Facility for vitrification of certain wastes generated by M-Area electroplating operations.
- Receive and store mixed waste in the most recently constructed mixed waste storage building (which has not yet been used).
- Construct additional mixed waste storage buildings as necessary to meet the demand for mixed waste storage.
- Dispose of mixed waste in the planned RCRA-permitted disposal vaults that will be constructed once the permit is approved.
- Continue constructing the Consolidated Incineration Facility.
- Construct additional Defense Waste Processing Facility organic waste storage tanks as necessary to meet the demand for benzene storage.
- Receive and store organic and aqueous liquid waste in planned storage tanks, with additional tanks constructed as necessary.
- Store transuranic and alpha waste on transuranic waste storage pads.
- Retrieve the drums of transuranic waste stored in earthen mounds on Transuranic Waste Storage Pads 2 through 6.
- Assay containers at the Experimental Transuranic Waste Assay Facility/Waste Certification Facility.
- Certify newly generated nonmixed alpha wastes for disposal in the low-activity waste vaults. TC

- Construct additional storage facilities (new transuranic waste storage pads) to accommodate the projected waste volumes.

2.2.7.1 Storage

DOE would continue to store wastes at the following facilities:

- 1 long-lived low-level waste storage building in E-Area
- 3 hazardous waste storage buildings in N- and B-Areas
- 3 hazardous waste storage pads in N-Area
- TC 4 mixed waste storage buildings in N-, M-, and E-Areas
- 3 mixed waste storage pads in E-Area
- 2 solvent storage tanks in E-Area (to be replaced by 4 solvent storage tanks in H-Area)
- 1 organic waste storage tank associated with the Defense Waste Processing Facility
- 10 Savannah River Technology Center mixed waste tanks in A-Area
- 10 mixed waste storage tanks in M-Area
- 1 proposed mixed waste storage pad in M-Area
- 19 transuranic (and alpha) waste storage pads in E-Area

Under the no-action alternative, DOE would need to construct additional waste storage facilities to accommodate the forecast 30-year waste generation. These facilities include:

- 24 long-lived low-level waste storage buildings
- 291 mixed waste storage buildings
- 19 transuranic (and alpha) waste storage pads
- TC 4 organic waste storage tanks associated with the Defense Waste Processing Facility
- 26 organic waste storage tanks in E-Area
- 43 aqueous waste storage tanks in E-Area

2.2.7.2 Treatment

DOE would continue ongoing or planned waste treatment at the Savannah River Technology Center, M-Area Vendor Treatment Facility, F/H-Area Effluent Treatment Facility, M-Area Air Stripper, Defense Waste Processing Facility and associated high-level waste management facilities, and the three existing low-level waste compactors.

2.2.7.3 Disposal

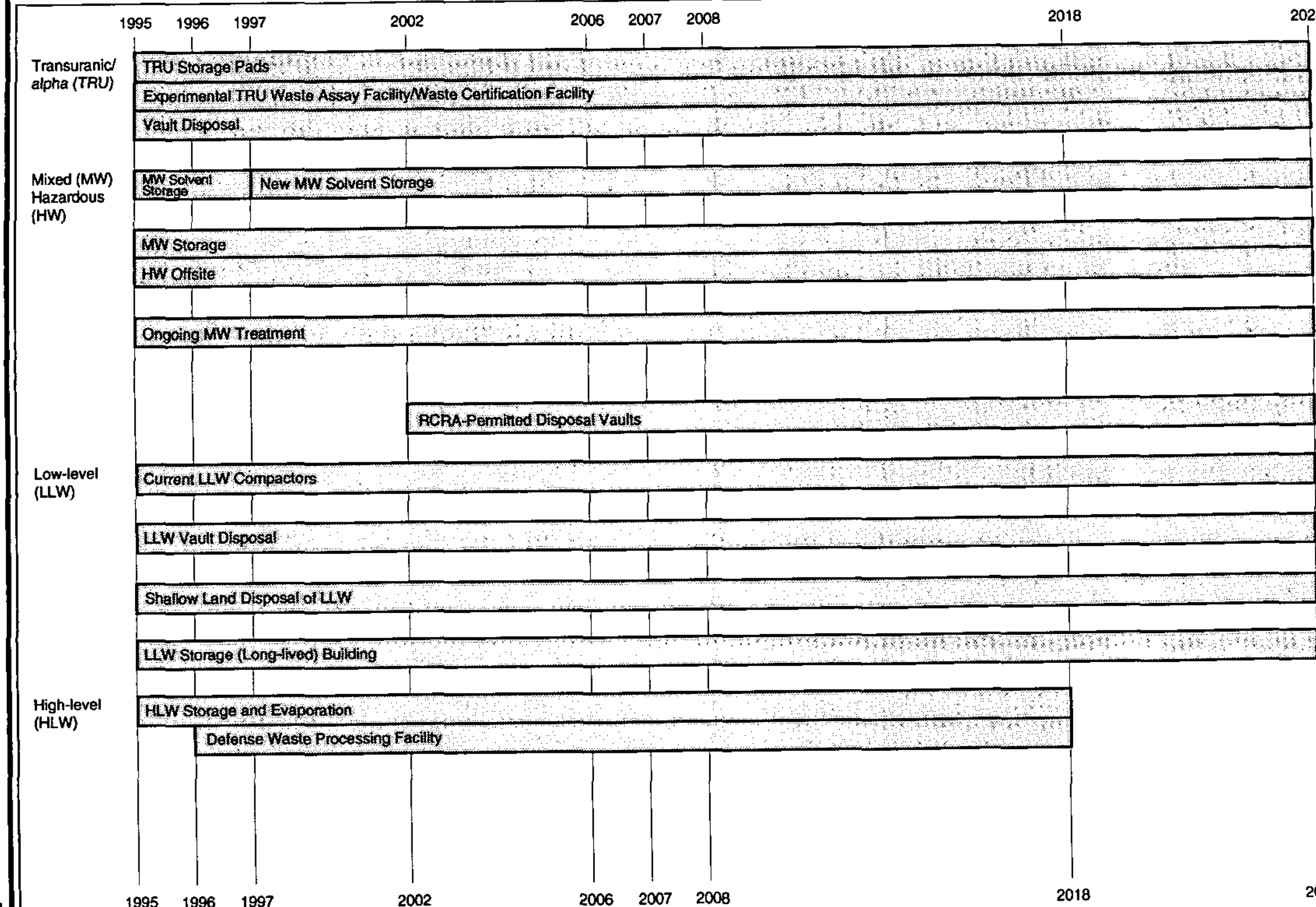
Under the no-action alternative, DOE would construct disposal facilities for mixed and low-level wastes. To accommodate the forecast 30-year waste generation, the following additional facilities would be required:

- 29 slit trenches [1,100 cubic meters (38,800 cubic feet) of usable capacity]
- 10 low-activity waste vaults [30,500 cubic meters (1.08×10^6 cubic feet) of usable capacity]
- 5 intermediate-level waste vaults [5,300 cubic meters (187,000 cubic feet) of usable capacity]
- 1 RCRA-permitted disposal vault [2,300 cubic meters (81,200 cubic feet) of usable capacity]

TC

Figure 2-14 shows a timeline for the on-going or planned waste management activities that would occur under the no-action alternative. For all waste types except high-level waste, the ongoing and planned waste management activities that would occur are shown in Figure 2-15.

TC



Sources: Hess (1994e, 1995a); DOE (1994a).

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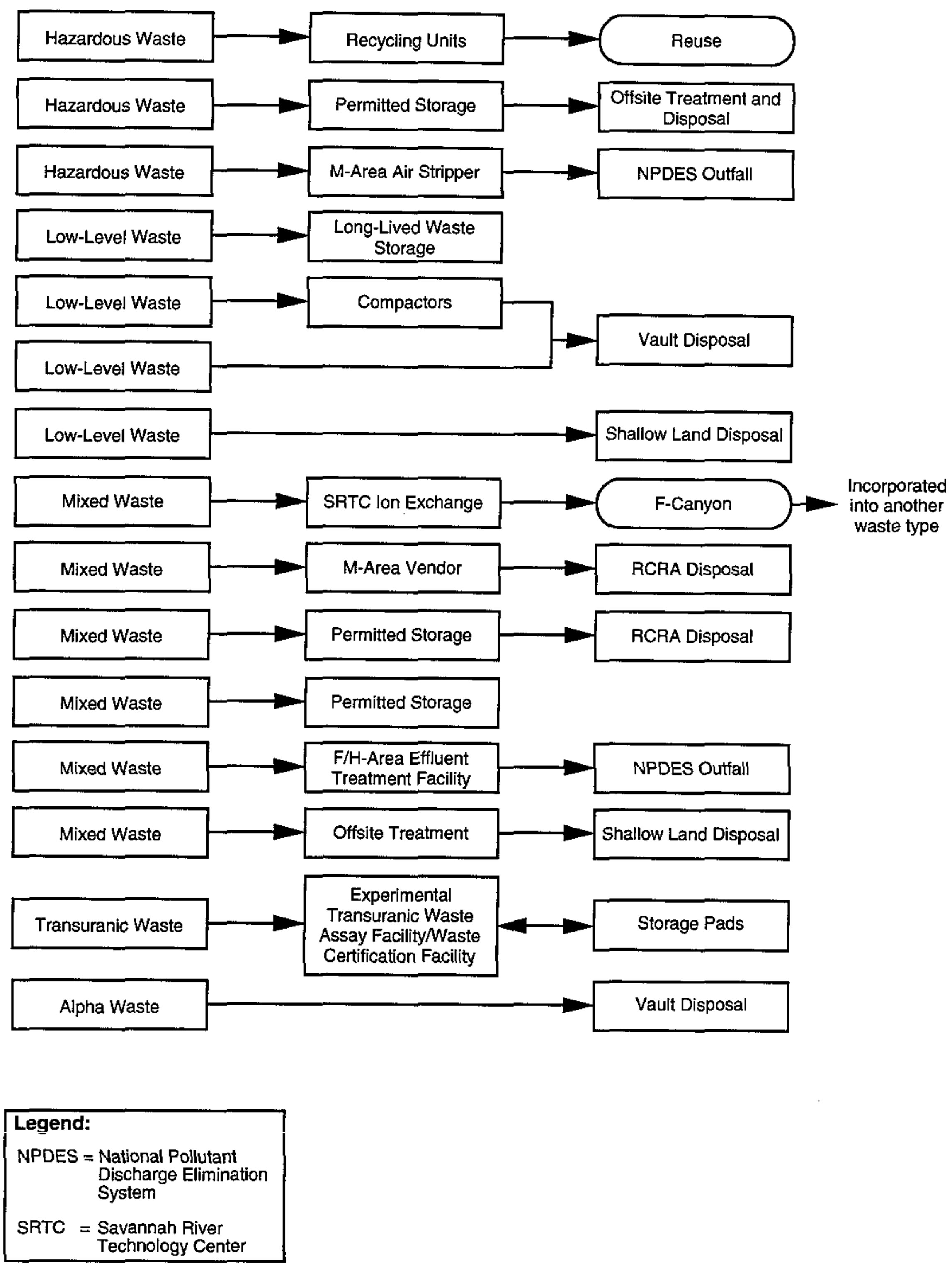
TE

Figure 2-14. Timeline for waste management facilities in the no-action alternative.



Source: Hess (1994e, 1995a).

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Figure 2-15. Summary of waste management activities in the no-action alternative .

2.3 Screening and Selecting Waste Management Technologies

This section describes the processes and methodologies used to evaluate and screen various technologies for treating, storing, and disposing of low-level radioactive, transuranic, mixed, and hazardous wastes that SRS may manage in the 30-year period from 1995 through 2024. DOE must evaluate and select technologies because continuation of current waste management practices (i.e., the no-action alternative) would not allow DOE to comply with environmental requirements. DOE did not evaluate alternative technologies to treat, store, or dispose of liquid high-level radioactive waste because, as identified in Section 2.2, vitrification of high-level waste in the Defense Waste Processing Facility was analyzed in the *Final Supplemental Environmental Impact Statement Defense Waste Processing Facility*. Section 2.3.1 presents the technologies assessed for potential application to the treatability groups of various low-level radioactive and transuranic waste.

The evaluation of mixed wastes (both low-level and transuranic) in this EIS is an extension of the
TE process of evaluating treatment options as documented in the *SRS Proposed Site Treatment Plan*. The site treatment plan addresses the treatment of mixed wastes over the next 5 years only, as required by RCRA and the Federal Facility Compliance Act (P.L. 102-386). This EIS, however, evaluates a 30-year
TE period, and thus must consider both wastes and potential technologies not considered in the site treatment plan. For example, large volumes of soils containing mixed waste are forecasted to be generated from environmental restoration (1995 through 2024) in this EIS, but only limited quantities of these soils were forecast in the 5 years (1995 through 1999) considered by the site treatment plan. Furthermore, DOE did
TE not evaluate technologies to treat transuranic mixed wastes in the site treatment plan. The plan does describe the various transuranic waste treatment studies that are under way to evaluate potential technologies, but does not specifically evaluate these technologies to identify a preferred option to treat transuranic mixed wastes to meet the Waste Isolation Pilot Plant waste acceptance criteria. Alternative technologies to treat, store, or dispose of the transuranic waste treatability groups (including mixed transuranic and mixed alpha wastes) are evaluated in this EIS. The *Treatment Selection Guides* (DOE 1994c), which document the overall technology selection process used by DOE in developing site treatment plans, guided the further screening of technologies considered in this EIS for these wastes, as presented in Section 2.3.2.

Hazardous waste is currently transferred to and managed at permitted treatment and disposal facilities outside of SRS, and this practice would continue, except for hazardous wastes amenable to processing in onsite facilities that treat mixed wastes with similar hazardous characteristics and have excess capacity and thus can accept these wastes. Section 2.3.2 identifies these facilities.

Although technology assessments first focused on specific waste treatability groups, DOE realized that some technologies were applicable to a range of groups. Furthermore, applying these technologies, in either existing or new facilities, to several waste groups would provide both economic and environmental advantages. Section 2.3.3 presents the derivation of and bases for these associations of waste groups for treatment by specific technologies.

2.3.1 SCREENING PROCESS FOR LOW-LEVEL AND TRANSURANIC WASTE

DOE used a structured, three-step screening process to identify possible technologies, select potential candidates, and choose reasonable technologies for various low-level and transuranic wastes. Wastes were aggregated into groups having common treatment, storage, and disposal requirements. Section 2.3.1.1 describes the process for identifying the possible technologies. The methods and criteria DOE used to assess them are presented in Section 2.3.1.2 for low-level waste and Section 2.3.1.3 for transuranic waste.

The screening process examined many technologies capable of remediating the individual treatability groups, and identified those that were viable from the perspectives of safety and environmental risk, cost, regulatory compliance, ability to meet functional need and performance expectations, and public acceptance. DOE then assembled for integration the technologies identified for low-level waste with similarly identified technologies for mixed and hazardous wastes. Figure 2-16 shows the screening process DOE used to identify the "menu" of reasonable technologies for low-level waste treatability groups. Although Figure 2-16 is based on low-level waste treatability groups, DOE screened the same technologies to select potential and then reasonable technologies for groups of transuranic waste. TE

2.3.1.1 Identification of Possible Technologies

The first step in the screening process was to identify possible technologies to treat, store, and dispose of low-level and transuranic wastes. A group of experts participated in an intensive brainstorming workshop. The group included representatives from all areas of SRS: facility managers, scientists from the Savannah River Technology Center doing research on remediation, engineers, technology developers, and technology consultants. DOE also consulted with various experts at other Federal agencies, state governments, universities, and the private sector, as appropriate.

The workshop generated a list of 85 possible technologies for managing these wastes. Table 2-14 identifies the 85 technologies. This list includes "storage" and three direct disposal technologies

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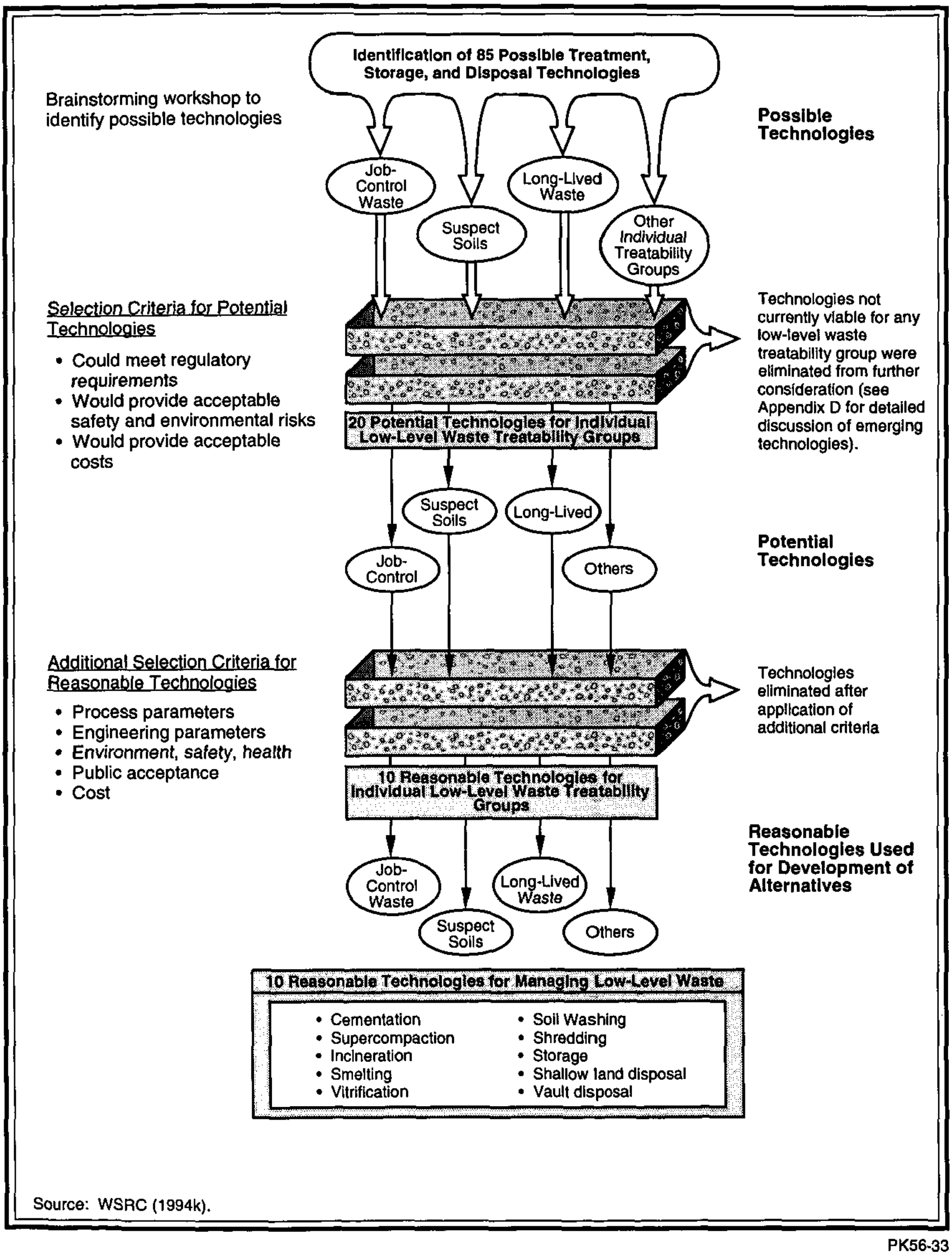

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Figure 2-16. Technology screening process for low-level waste treatability groups. The same technology screening process was applied to transuranic waste treatability groups.

Table 2-14. Possible technologies to manage low-level and transuranic waste.[a]

Abrasive blasting	Microwave
Absorption	Molten glass
Acid/base digestion, solids dissolution	Molten salt destruction
Activated sludge	Neutralization
Advanced electrical reactor	Oil/water separation
Aerobic bio treatment	Oxidation by H_2O_2
Air stripping	Ozonation
Alkali metal dechlorination	Phase separation
Alkali metal/polyethylene glycol	Plasma torch
Alkaline chlorination	Polymerization
Amalgamation	Pyrolysis
Anaerobic digestion	Recycle
Asphalt-based microencapsulation	Repackage/containerize
Bio-reclamation	Reverse osmosis
Blast furnaces	Roasting/retorting
Carbon adsorption	Rotary kiln incineration
Catalytic dehydro chlorination	Rotating bio contactors
Cementation	Scarification/grinding/planing
Centrifugation	Sealing
Chelation	Sedimentation
Chemical hydrolysis	Shallow land disposal
Chemical oxidation/reduction	Shredding/size reduction
Chemical precipitation	Smelting
Circulating bed combustion	Soil flushing/washing
Compaction	Solvent extraction
Crystallization	Sorption
Dissolved air flotation	Sorting/reclassifying
Distillation	Spalling
Electrodialysis	Steam stripping
Evaporation	Storage
Filtration	Supercompaction
Flocculation	Supercritical extraction
Fluidized bed incinerator	Supercritical water oxidation
Heavy media separation	Thermal desorption
High pressure water steam/spray	Ultraviolet photolysis
High-temperature metal recovery	Vault disposal
Industrial boilers	Vibratory finishing
Industrial kilns	Vitrification
Ion exchange	Waste Isolation Pilot Plant disposal
Lime-based pozzolans	Water/washing spraying
Liquid injection incinerators	Wet air oxidation
Liquid/liquid extraction	White rot fungus
Macroencapsulation	

a. Source: WSRC (1994k).

TC

(shallow land disposal, vault disposal, and Waste Isolation Pilot Plant disposal) in which the waste is sent directly to a disposal unit without treatment. Table D.1 of Appendix D describes the 81 possible treatment technologies. The following sections describe the evaluation of these technologies for low-level and transuranic wastes.

2.3.1.2 Selection of Potential and Reasonable Technologies for Low-Level Waste

Before the technologies could be matched to low-level wastes for evaluation, DOE combined low-level wastes into groups that had common treatment, storage, and disposal requirements. Twelve waste categories were defined for low-level waste, as described in Section 2.1 (WSRC 1994k). Table 2-15 presents the application of the 85 possible management technologies to the 12 waste categories. Note that each of the potential treatment technologies accomplish one (or more) of three functions: "decontamination" to separate the radioactive constituents from the other components of the waste;
TE "volume reduction" to reduce the size of material requiring management; and "stabilization" to immobilize radioactive materials. DOE screened the technologies to determine which had the best potential for success; a technology had to meet the following criteria to be deemed a potential technology:

- It could reasonably be expected to work on SRS wastes and meet regulatory requirements.
- It would pose acceptable safety and environmental risks.
- Its costs were comparable to other possible technologies.

Application of these criteria eliminated most of the technologies, many of which are emerging technologies not suitable for detailed evaluation at this time. The other reason for eliminating
TE technologies in the potential technology screening step was that they would be ineffective for either decontaminating, reducing the volume of, or stabilizing low-level waste. Table 2-15 identifies 20 potential technologies that were selected based on the criteria. In certain instances, these potential technologies are subsets of the same source technology (e.g., compaction and supercompaction); in other instances, the source technology is expanded to meet the needs of the treatability group (e.g., storage was expanded to storage/venting for tritiated soils). As another example, decontamination could be achieved by applying one of several technologies, such as distillation, reverse osmosis, or steam stripping. Some technologies (e.g., vitrification) could be applied to many low-level waste treatability groups, while others (e.g., decontamination) have limited applications (Table 2-15).

Table 2-15. Potential and reasonable technologies for managing low-level waste.[a]

Offsite job-control waste		Low-activity job-control waste		Intermediate-activity job-control waste	
Potential	Reasonable[b]	Potential	Reasonable	Potential	Reasonable
Acid/base digestion	Shallow land disposal (after stabilization) (1)	Acid/base digestion	Cementation (3)	Acid/base digestion	Cementation
Cementation	Vault disposal (2)	Cementation	Supercompaction (4)	Cementation	Supercompaction
Compaction		Compaction	Incineration (5)	Compaction	Incineration
Supercompaction		Supercompaction	Vitrification (6)	Supercompaction	Shallow land disposal (after stabilization)
Microwave		Microwave	Shallow land disposal (after stabilization)	Microwave	Vault disposal
Plasma torch		Plasma torch	Vault disposal	Plasma torch	Vitrification
Incineration		Incineration		Incineration	
Shallow land disposal (after stabilization)		Shallow land disposal (after stabilization)		Shallow land disposal (after stabilization)	
Smelting		Smelting		Smelting	
Vault disposal		Vault disposal		Vault disposal	
Vitrification		Vitrification		Vitrification	
Washing		Washing		Washing	

Long-lived spent deionizer waste		Other long-lived waste		Tritiated job-control waste	
Potential	Reasonable	Potential	Reasonable	Potential	Reasonable
Cementation	Cementation	Cementation	Cementation	Acid/base digestion	Cementation
Shallow land disposal (after stabilization)	Storage (7)	Shallow land disposal (after stabilization)	Storage	Cementation	Supercompaction
Storage		Storage	Vitrification	Compaction	Incineration
Vault disposal		Vault disposal		Supercompaction	Shallow land disposal
Vitrification		Vitrification		Microwave	Vault disposal
				Plasma torch	Vitrification
				Incineration	
				Shallow land disposal[c]	
				Smelting	
				Vault disposal	
				Vitrification	
				Washing	

Table 2-15. (continued).

Suspect soil		Low-activity soil		Tritiated soil	
Potential	Reasonable	Potential	Reasonable	Potential	Reasonable
Cementation	Cementation	Cementation	Cementation	Cementation	Cementation
Repackage/Containerize	Soil washing (8)	Repackage/Containerize	Soil washing	Incineration	Shallow land disposal (after stabilization)
Soil washing	Shallow land disposal	Soil washing	Shallow land disposal (after stabilization)	Repackage/Containerize	Vault disposal
Shallow land disposal	Vault disposal	Shallow land disposal (after stabilization)	Vault disposal	Soil washing	
Vault disposal		Vault disposal	Vitrification	Shallow land disposal (after stabilization)	
Vitrification		Vitrification		Storage/venting	
				Vault disposal	
				Vitrification	

Tritiated equipment		Naval hardware		Low-activity equipment	
Potential	Reasonable	Potential	Reasonable	Potential	Reasonable
Cementation	Supercompaction	Cementation	Shallow land disposal	Cementation	Cementation
Supercompaction	Shred/size reduction/ cementation (9)	Decontamination	Vault disposal	Decontamination	Supercompaction
Plasma torch	Shallow land disposal (after stabilization)	Repackage/Containerize		Supercompaction	Smelting (10)
Recycle	Vault disposal	Shredding/size reduction		Repackage/Containerize	Shallow land disposal (after stabilization)
Repackage/Containerize		Shallow land disposal		Size reduction	Vault disposal
Shredding/size reduction		Smelting		Shallow land disposal (after stabilization)	
Shallow land disposal (after stabilization)		Storage		Smelting	
Smelting		Vault disposal		Storage	
Storage				Vault disposal	
Vault disposal					

a. Source: WSRC (1994k).
b. Numbers in parentheses show the 10 reasonable technologies chosen.
c. Indicates shallow land disposal without prior stabilization of waste.

Many of the innovative technologies that were not selected are undergoing full- or pilot-scale demonstration programs and could provide additional options for waste management in the future. Appendix D summarizes innovative and emerging technologies that were eliminated from detailed consideration at this time. Many of these technologies were eliminated because they are not commercially available, have not been proven to work on the waste types at SRS, or are not economically or technically viable at this time. This EIS supports future sitewide programmatic decisions based on a 30-year forecast of waste generation, but the analyses performed support project-level decisions on the construction and operation of specific treatment, storage, and disposal facilities only within the near term (10 years or less). Some of the emerging technologies may prove viable in the future (i.e., beyond the next 10 years) and may be chosen for more detailed design and operations analyses later.

In the next step, DOE screened the 20 potential technologies for their appropriateness for low-level and transuranic waste treatability groups using more detailed evaluation criteria. The process consisted of scoring each of the remaining 20 technologies based on selected attributes of five criteria. Each attribute of each criterion was weighted in a way similar to that used in the site treatment plan, and the technology was assigned a score based on how well it meets the goals of the attribute of each criterion. The attribute weight was multiplied by the technology score to get a net score for each attribute for each technology. The net scores were then summed, with the higher scores identifying the more desirable technologies. The weighting and scoring guides are shown below:

	Weight of each	Score		
Criteria: Attribute	element[a]	3	2	1
Process Parameters:				
Volume alteration	3	Decreased	Maintained	Increased
Secondary waste forecast	2	Minimal	Treatable	Untreatable
Decontamination and demobilization efficiency	3	Decontaminated and demobilized	Reduces contamination or mobility	No change
Engineering Parameters:				
System implementability	2	In full-scale operation	Not in full-scale operation	Not evaluated for treatability group
Availability	1	Exists onsite	Other DOE site or vendor	No full-scale operating facility
Maintainability	1	Simple or no maintenance	Less than 25% downtime	More than 25% downtime

Criteria: Attribute	Weight of each element[a]	Score		
		3	2	1
Environment, Safety, and Health:				
Risk to offsite population and Environment	3	Lower third of technologies evaluated	Middle third of technologies evaluated	Upper third of technologies evaluated
Operational worker health and safety considerations	2	Less than 10 workers	10-20 workers	More than 20 workers
Transportation risk	1	No transportation	Onsite transportation	Offsite transportation
Public Acceptance	3	Acceptable	Neutral	Not acceptable
Cost	4	Lower third of technologies evaluated	Middle third of technologies evaluated	Upper third of technologies evaluated

a. The weight of each element is a qualification of the relative importance of each attribute. For example, volume alteration, decontamination and demobilization efficiency, risk to offsite population and environment, and public acceptance are equally important, and each is more important than any other attribute except cost.

Source: WSRC (1994k).

As an example, Table 2-16 applies the scoring procedure to the incineration of intermediate-activity job-control waste.

Application of these additional criteria resulted in the identification of 10 reasonable technologies. The 10 reasonable technologies are identified in Figure 2-16 and Table 2-15 and are described in greater detail in Appendix B. Reasons for eliminating certain technologies for particular treatability groups included immature technology (e.g., plasma torch for tritiated equipment), a large or untreatable secondary waste stream (e.g., vitrification of long-lived spent deionizer resin), and being ineffective for a particular waste stream matrix (smelting of offsite job-control waste).

2.3.1.3 Selection of Potential and Reasonable Technologies for Transuranic Waste

Table 2-17 presents the 85 possible waste management technologies and their application to transuranic waste treatability groups. DOE combined the transuranic wastes into nine waste categories based on their alpha activity levels, their curie content, and the type of waste (e.g., job-control waste). After characterization (a process of reexamining and analyzing the contents of packaged transuranic wastes currently in storage), much of the waste that is currently managed as transuranic waste would be

Table 2-16. Example of scoring the incineration technology for intermediate-activity job-control waste.[a]

Criteria/Attribute	Weighting Factor	Score	Net Score	Discussion/Notes
In-depth options analysis for reasonable options				
Waste category: Intermediate-activity job-control waste				Process being evaluated: Incineration
Process Parameters				
Volume alteration	3	3	9	Assumed 8 to 1 reduction in initial waste volumes after stabilization of both treated and secondary wastes.
Secondary waste generation	2	3	6	Secondary waste easily treated using currently available technologies.
Decontamination and demobilization efficiency	3	2	6	No destruction or removal of contaminants. Decreased mobility due to stabilization of both treated and secondary wastes.
Engineering Parameters				
System implementability	2	3	6	Incineration of intermediate-activity job-control waste is a well demonstrated and proven technology.
Availability	1	3	3	Facility being built onsite. Commercially available incinerators exist offsite.
Maintainability	1	1	1	Assume 50 percent downtime for maintenance and batching of waste.
Environmental, Health, and Safety				
Risks to offsite population/environment	3	1	3	Increased potential for accidents. Inventory control minimizes impacts of a release due to an accident. Ranks in upper third of technologies evaluated.
Operational worker health and safety	2	1.5	3	More than 20 workers; increased handling and processing and increased system complexity.
Transportation risk	1	2	2	Onsite transportation required.
Public Acceptance				
Public acceptance	3	1.5	4.5	Concern because treatment is a high-temperature process, yielding emissions, though minimal.
Cost Considerations				
Costs developed according to draft site treatment plan	4	2	8	Cost of technology is in the middle third for technologies selected for this waste.
Total	25		51.5	
Total Technical Weighted Score				
Actual score excluding cost	[43.5] ×			
Factor to adjust max score to 100	[100] ÷			
Max possible score excluding cost	[21×3] =	69.05		
Total Weighted Score				
Actual score	[51.5] ×			
Factor to adjust max score to 100	[100] ÷			
Max possible score	[25×3] =	68.67		

a. Source: Hess (1994a).

Table 2-17. Potential and reasonable technologies for transuranic waste.[a]

Alpha job-control waste		Mixed-alpha job-control waste		Transuranic job-control waste less than 0.5 curie per drum	
Potential	Reasonable	Potential	Reasonable	Potential	Reasonable
Acid/base digestion	Cementation (1)	Acid/base digestion	Cementation	Acid/base digestion	Cementation
Cementation	Supercompaction (2)	Cementation	(Characterize)/repackage	Cementation	Supercompaction
(Characterize)/repackage	(Characterize)/repackage (3)	(Characterize)/repackage	Incineration	(Characterize)/repackage	(Characterize)/repackage
Compaction	Incineration (4)	Compaction	RCRA disposal (8)	Compaction	Incineration
Decontamination	Shallow land disposal (after stabilization) (5)	Decontamination	Storage (9)	Decontamination	Storage
Incineration	Vault disposal (6)	Incineration	Vitrification	Incineration	Vitrification
Plasma torch	Vitrification (7)	Plasma torch	Waste Isolation Pilot Plant disposal (10)	Plasma torch	Waste Isolation Pilot Plant disposal
Shallow land disposal (after stabilization)		RCRA disposal		Storage	
Supercompaction		Storage		Supercompaction	
Vault disposal		Supercompaction		Vitrification	
Vitrification		Vitrification		Waste Isolation Pilot Plant disposal	
		Waste Isolation Pilot Plant disposal			

Mixed transuranic job-control waste less than 0.5 curie per drum		Transuranic job-control waste greater than 0.5 curie per drum		Mixed transuranic job-control waste greater than 0.5 curie per drum	
Potential	Reasonable	Potential	Reasonable	Potential	Reasonable
Acid/base digestion	Cementation	Acid/base digestion	Cementation	Acid/base digestion	Cementation
Cementation	Supercompaction	Cementation	Supercompaction	Cementation	Supercompaction
(Characterize)/repackage	(Characterize)/repackage	(Characterize)/repackage	(Characterize)/repackage	(Characterize)/repackage	(Characterize)/repackage
Compaction	Incineration	Compaction	Incineration	Compaction	Incineration
Decontamination	Storage	Decontamination	Storage	Decontamination	Storage
Incineration	Vitrification	Incineration	Vitrification	Incineration	Vitrification
Plasma torch	Waste Isolation Pilot Plant disposal	Plasma torch	Waste Isolation Pilot Plant disposal	Plasma torch	Waste Isolation Pilot Plant disposal
Storage		Storage		Storage	
Supercompaction		Supercompaction		Supercompaction	
Vitrification		Vitrification		Vitrification	
Waste Isolation Pilot Plant disposal		Waste Isolation Pilot Plant disposal		Waste Isolation Pilot Plant disposal	

Table 2-17. (continued).

Transuranic equipment		Mixed transuranic equipment		Remotely handled transuranic and mixed transuranic	
Potential	Reasonable	Potential	Reasonable	Potential	Reasonable
Acid/base digestion Cementation (Characterize)/repackage Compaction Decontamination Incineration Plasma torch Shallow land disposal (after stabilization) Supercompaction Vault disposal Vitrification	Cementation Supercompaction (Characterize)/repackage Incineration Shallow land disposal (after stabilization) Vault disposal Vitrification	Acid/base digestion Cementation (Characterize)/repackage Compaction Decontamination Incineration Plasma torch RCRA disposal Storage Supercompaction Vitrification Waste Isolation Pilot Plant disposal	Cementation (Characterize)/repackage Incineration RCRA disposal Storage Vitrification Waste Isolation Pilot Plant disposal	Acid/base digestion Cementation (Characterize)/repackage Compaction Decontamination Incineration Plasma torch Storage Supercompaction Vitrification Waste Isolation Pilot Plant disposal	Cementation Supercompaction (Characterize)/repackage Incineration Storage Vitrification Waste Isolation Pilot Plant disposal

a. Source: Hess (1994a).

reclassified as alpha waste or mixed alpha waste because the characterization will confirm that the wastes have activity levels between 10 and 100 nanocuries per gram (referred to as "alpha waste" in this TE EIS). Nine waste categories were defined for transuranic and alpha waste (WSRC 1994k), as described in Section 2.1.

TE The evaluation process described in Section 2.3.1.2 was applied to transuranic and alpha waste categories to select potential and reasonable treatment, storage, and disposal technologies. Again, most of the technologies were eliminated in the first screening step. Table 2-17 identifies 14 potential technologies. Of the potential technologies, acid/base digestion, compaction (but not supercompaction), decontamination, and plasma torch were eliminated in the selection of reasonable technologies. Many of the reasonable technologies for transuranic waste, which are described in greater detail in Appendix B, are the same as those selected for low-level waste (Tables 2-15 and 2-17).

TE There is little difference in the reasonable technologies for transuranic waste among the categories, except for the method of disposal. The alpha waste would be disposed of as low-level waste by shallow land disposal or vault disposal. Mixed alpha waste would be disposed of onsite in a RCRA-permitted disposal facility (e.g., shallow land disposal or vault disposal). The fractions of job-control waste that contain greater than or equal to 100 nanocuries per gram would be treated to meet waste acceptance criteria and shipped to the Waste Isolation Pilot Plant for disposal.

2.3.2 SCREENING PROCESS FOR MIXED AND HAZARDOUS WASTES

This section describes the screening process used to identify possible technologies, select potential technologies, and select reasonable technologies for the treatment of mixed and hazardous wastes.

TE DOE based the screening process for mixed wastes primarily on the analyses done for the *SRS Draft Site Treatment Plan* (DOE 1994d), which identifies treatment options for 59 waste streams. Prior to evaluating options for the site treatment plan, DOE determined that a number of wastes required no further evaluation. Twenty-five wastes already had existing or planned treatment programs in the SRS waste management plan. Three wastes were consolidated for purposes of options analysis and four were deleted. Furthermore, DOE did not evaluate possible technologies for the three transuranic-mixed and TE two alpha-mixed waste categories. Alternatives for these transuranic and alpha wastes are addressed in this EIS, as discussed in Section 2.3.1.3. This technology screening process identified 22 low-level mixed wastes for which further analysis of treatment options was required. The following section describes the in-depth evaluation of the remaining 22 low-level mixed wastes.

2.3.2.1 Options Analysis in the Site Treatment Plan

The SRS draft site treatment plan describes a three-step process for evaluating options for treating mixed waste: identifying feasible options; screening these options; and analyzing the most promising options in depth. The first step, identification of feasible options, resulted in a list of existing and planned facilities that were capable of treating mixed wastes. Technical personnel from each candidate facility and a group of SRS engineers and scientists evaluated these options. TE

The initial screening assessed the maturity and complexity of the technology used in each feasible option. This assessment favored simple and well-established technologies. A success-factor score was assigned to each technology and the highest-ranking options based on those scores were analyzed further; low-scoring options were rejected. The rejected technologies were unproven and could not be recommended at this time.

After identifying the better options, the in-depth analysis identified the preferred option for a given waste using a model that assigned numerical scores to a set of criteria and requirements. The options analysis model was developed from the *Treatment Selection Guides* and the *Draft Site Treatment Plan Development Framework* (DOE 1994e). The model assigned numerical scores to each attribute and applied a weighting factor based on the relative importance of the attributes to provide an overall score to rank the option. These scores were used to reduce the list of possible options to a more manageable number for further analysis and review. The final step of the options analysis was an engineering assessment that considered less quantifiable factors than those assessed by the model to identify the preferred option for each waste.

Details of the options analyses and the preferred options can be found in the SRS draft site treatment plan. DOE continues to refine the option analyses performed for the draft site treatment plan and to incorporate additional mixed waste streams as they are identified. The Options Analysis Team was formed by DOE to evaluate the preferred treatment options proposed in individual sites' draft treatment plans from a complex-wide perspective. This evaluation encompassed considerations such as requirements to develop similar treatment capability at more than one DOE site that could be met by the implementation of a single mobile treatment unit, and economies of scale in the construction and operation of treatment facilities. As a result of refinements and additions to the draft site treatment plan options analyses, the *SRS Proposed Site Treatment Plan* incorporated the changes described below. TE TE TE

The Options Analysis Team's *Proposed Changes to the Draft Site Treatment Plan Mixed Waste Treatment Configuration* (DOE 1994f) recommended alternate preferred treatment options for two SRS

TE

mixed-waste streams. DOE is investigating the potential for a small quantity (less than 1 cubic meter) of calcium metal waste to be treated using a mobile unit located at the Los Alamos National Laboratory. In addition, DOE is considering a mobile unit using a packed bed reactor technology at SRS for the treatment of tritiated oil. Tritiated oil is not amenable to treatment using any currently available technologies and, in this EIS, was proposed for continued storage pending further technology development.

TE TC

In-depth options analyses were not performed for mixed alpha waste streams in the draft site treatment plan. However, DOE conducted analyses for two mixed alpha waste streams for the proposed site treatment plan. The preferred options for these waste streams are consistent with the alternatives considered in this EIS.

TC

Twelve new mixed-waste streams were identified after the development of the draft site treatment plan:

- Four new investigation-derived wastes; the volumes and characteristics of these waste streams and their preferred treatment options would be established at a later date as part of the RCRA/Comprehensive Environmental Response, Compensation, and Liability Act remedial decisions.

TE TC

- Off-specification mercury reclaimed from the Defense Waste Processing Facility that may potentially be classified as a mixed waste. The small volume (approximately 0.2 cubic meters over 5 years) could be managed like the elemental mercury waste considered in this EIS.

TC

- Liquid high-level waste sludge and supernatant-contaminated debris from F- and H-Area tank farm operations (approximately 1,065 cubic meters over 5 years) that could be treated by acid washing at an existing SRS containment building, followed by vitrification of the spent acid solution.

TC

- Three additional mixed waste streams (a total of approximately 24 cubic meters over 5 years) that could be treated at the Consolidated Incineration Facility.

TC

- Noncombustible debris contaminated with toxic constituents. Small volumes of these wastes could be macroencapsulated (coated with a polymer) at the facilities that generate them or they could be accommodated by the containment building for treating mixed wastes considered in this EIS.

- One mixed-waste stream that conforms to the RCRA land disposal treatment standard for macroencapsulation in the form in which it is generated.

- One additional mixed-waste stream that could be macroencapsulated (welded into a stainless steel box) under a treatability variance. TC

Details of the options analyses and the preferred options for these wastes can be found in the *SRS Proposed Site Treatment Plan.* TC

The changes and additions described here were incorporated in the analyses presented in this EIS. DOE TC anticipates that many of the newly identified wastes will be generated in very small volumes. The characteristics of the additional wastes are not substantially different from wastes considered in the draft. TE The proposed treatment technologies are consistent with mixed waste technologies considered within the alternatives of this EIS. The following section describes how these preferred options were used in this EIS to identify reasonable technologies for managing mixed wastes.

2.3.2.2 Selection of Reasonable Technologies for Mixed and Hazardous Wastes

DOE used the options analyses performed for the SRS site treatment plan to develop the list of potential and reasonable technologies for hazardous and mixed wastes evaluated in this EIS. The preferred options identified in the *SRS Proposed Site Treatment Plan* correspond to the technologies evaluated in TE alternative B.

DOE aggregated the mixed waste into treatability groups that had common management requirements. These treatability groups consist of mixed wastes that may be managed at SRS but did not appear in the 5-year forecast used in the SRS draft site treatment plan. In other words, these new groups represent mixed wastes that SRS may manage between 2000 and 2024. The analyses performed for the site TE treatment plan were applied to these new treatability groups. Table 2-18 presents a summary comparison of the new treatability groups, the corresponding mixed wastes in the site treatment plan and the preferred options, and the technologies selected for consideration in this EIS. The following paragraphs describe the treatability groups and technology selections for which there is not a direct correlation between the site treatment plan and the EIS.

Table 2-18. Waste Management EIS and *SRS Proposed Site Treatment Plan* comparison of treatment options for low-level mixed waste.

EIS treatability group	EIS treatability group subcategories	PSTP[a] waste streams	PSTP preferred options	Reasonable EIS technologies
Glass debris		Not considered	none	Macroencapsulation Vitrification
Metal debris		Not considered	none	Macroencapsulation
Bulk equipment		Not considered	none	Macroencapsulation
Lead		Low-level waste lead	Offsite decontamination	same
		Low-level waste lead	Macroencapsulation	Macroencapsulation Vitrification
Heterogeneous debris	All heterogeneous debris including streams specifically called out in the PSTP	Not considered	none	Incineration Macroencapsulation Vitrification
		Spent filter cartridges and carbon filter media	Incineration	Incineration Vitrification
Inorganic debris	All inorganic debris including streams specifically called out in the PSTP	Not considered	none	Incineration Macroencapsulation Vitrification
		Mercury/tritium-Contaminated Equipment Cadmium safety/control rods	Macroencapsulation Macroencapsulation	same same
		ITP[b] and Late Wash filters	Treatability variance	same
		Calcium metal	Wet oxidation	same
		Toxic characteristic contaminated debris	Macroencapsulation	Macroencapsulation Vitrification
		Supernatant and sludge-contaminated debris from high-level waste operations	Extraction or Macroencapsulation	same
Organic debris	All other organic debris including streams specifically called out in the PSTP	Not considered	none	Incineration Macroencapsulation Vitrification
		Solvent contaminated debris Incinerable toxic characteristic material Plastic/lead/cadmium raschig rings	Incineration	Incineration Vitrification
	Job-control waste with enriched uranium and solvent applicators	Job-control waste with enriched uranium and solvent applicators	None	Storage
	Mixed waste requiring size reduction and/or repackaging for CIF[c]	Filter paper take-up rolls Mark-15 filter paper Job-control waste containing solvent-contaminated wipes	Incineration	Incineration Vitrification

TC

Table 2-18. (continued).

EIS treatability group	EIS treatability group subcategories	PSTP[a] waste streams	PSTP preferred options	Reasonable EIS technologies
Organic liquid	All other organic liquids including streams specifically called out in the PSTP	Not considered	none	Incineration Vitrification
	DWPF[d] Benzene	DWPF Benzene	Incineration	Incineration Vitrification
	PUREX[e] solvent	Tributyl phosphate and n-Paraffin	Incineration	Incineration Vitrification
	Radioactive oil	Not considered	none	Incineration Vitrification
		Rad-contaminated[f] solvent Mixed waste oil	Incineration	Incineration Vitrification
Paint waste		Paint and thinner	Incineration	Incineration Vitrification
Composite filters		Not considered	none	Incineration Vitrification
Tritiated oil		Tritiated oil with mercury	Storage	same
Aqueous liquids	All other aqueous liquids including those specifically called out in the PSTP	Not considered	none	Incineration Vitrification
		Aqueous mercury and lead	Ion Exchange	same
		Mixed waste from laboratory samples Wastewater from TRU[g] drum dewatering	Incineration	Incineration Vitrification
	SRTC[h] aqueous	SRTC low-activity waste SRTC high-activity waste	Ion Exchange	same
	Aqueous liquids from groundwater monitoring well operations (investigation-derived waste)	Not considered	none	Ion exchange
Soils		Soils from spill remediation	Vitrification	Vitrification Incineration
Organic sludge		Not considered	none	Vitrification Incineration
Inorganic sludge	All inorganic sludge including streams specifically called out in the PSTP	Not considered	none	Incineration Vitrification
		Tank E-3-1 clean-out material	Stabilization	Stabilization Vitrification
PCBs		Not considered	none	Offsite treatment/onsite disposal
M-Area wastes		M-Area plating-line sludge from supernatant treatment Mark-15 filtercake M-Area sludge treatability samples M-Area high-nickel plating-line sludge	Vitrification	same

TC

Table 2-18. (continued).

EIS treatability group	EIS treatability group subcategories	PSTP[a] waste streams	PSTP preferred options	Reasonable EIS technologies
M-Area wastes (continued)		Plating-line sump material Nickel plating-line solution Uranium/chromium solution		
Elemental mercury		Tritium-contaminated mercury Elemental (liquid) mercury DWPF mercury	Amalgamation	same
Silver saddles		Silver-coated packing material	Macroencapsulation	same
Gold traps		Gold traps	No treatment required	same

TC

Source: WSRC (1994c); DOE (1994d); Hess (1994e); Hess (1995a).
a. *Proposed Site Treatment Plan.*
b. In-Tank Precipitation.
c. Consolidated Incineration Facility.
d. Defense Waste Processing Facility.
e. Plutonium-Uranium Extraction.
f. Radioactively contaminated.
g. Transuranic.
h. Savannah River Technology Center.

The site treatment plan includes several treatments for low-volume wastes at the individual facilities which produce them. These wastes would be treated by the facilities that generate them rather than as a part of the sitewide waste management program. DOE did not consider management alternatives for these mixed wastes in the EIS.

DOE evaluated radioactive oil and low-level PCB wastes in the options analysis for this EIS because management of these materials at SRS is similar to that of mixed wastes. Reasonable technologies were identified for the radioactive oil based on its treatability group (organic liquids). The quantities of low-level PCB wastes that require treatment are not large enough to economically justify applying the more stringent regulatory requirements of the Toxic Substances Control Act (which governs PCB treatment) to the technologies selected for mixed wastes treated onsite. Accordingly, DOE determined that existing offsite treatment would be the reasonable alternative for both radioactive and nonradioactive PCB wastes for the 30-year period considered in this EIS.

The change from weapons production at SRS to decontamination, decommissioning, and environmental restoration is expected to generate appreciably larger volumes of some treatability groups than those considered in the 5-year forecast used in the site treatment plan. For those wastes, DOE would modify TC the technology proposed in the site treatment plan to accommodate the larger volume. For example, the plan proposes a temporary vitrification process to treat a fixed and relatively limited quantity of soils and sludges. In this EIS, DOE proposes to use the temporary vitrification process during the first 5 years, but would replace it with a permanent vitrification facility to treat the increased volume of soils and sludges anticipated in years 6 through 30. Similarly, DOE would construct the containment building proposed in TE this EIS as a stand-alone facility to accommodate quantities of waste too large to be managed within existing SRS facilities, or wastes for which there is no existing facility that conforms to RCRA standards. TE

Many of the treatability groups of debris generated by decontamination, decommissioning, and environmental restoration are less well defined than the wastes addressed in the site treatment plan because these wastes have not yet been generated. This EIS identifies multiple technologies to accommodate the anticipated variability of these wastes.

DOE proposes that it continue to send hazardous wastes to offsite treatment and disposal facilities, except for wastes amenable to treatment in onsite facilities that have excess capacity. Hazardous wastes were assumed to be managed by the same technologies evaluated for mixed wastes of the same treatability group.

The method of disposal is dictated by the treatment technologies and the hazardous constituents of the waste. Mixed and hazardous wastes listed under RCRA (40 CFR 261.D) must be managed in accordance with RCRA after treatment. Mixed and hazardous wastes that exhibit a RCRA-regulated characteristic (ignitability, corrosivity, reactivity, or toxicity) may be treated to eliminate the characteristic; if the characteristic is eliminated, the treated waste need not be sent to a RCRA facility. The reasonable technologies for disposal of mixed and hazardous wastes were identified based on the composition of the treatability groups with respect to listed and characteristic wastes.

TC | 2.3.3 SYSTEM EVALUATION/OPTIMIZATION FOR THE ACTION ALTERNATIVES

Upon completion of the options analysis for each treatability group, the higher-ranked technologies for each group were compiled in a single list of candidate technologies for the waste management program. DOE reviewed this list to identify technologies capable of handling a wide range of wastes. Application of such technologies, either in existing or planned facilities, to several waste groups would provide both economic and environmental advantages over the construction of numerous specialized treatment facilities. With that goal in mind, the candidate technologies were ranked according to the following criteria:

- technologies with facilities currently existing onsite
- technologies with facilities under construction or planned at SRS
- technologies that had been identified in the draft site treatment plan as preferred options to treat mixed wastes
- technologies proposed for treating transuranic waste to meet the Waste Isolation Pilot Plant waste acceptance criteria
- technologies proposed for treating low-level wastes

The first two criteria promote efficient use of existing and planned capabilities and resources. The remainder address the specificity of the regulatory requirements applicable to each waste.

TC | RCRA imposes specific requirements on waste management. In its site treatment plan, DOE proposed to the State of South Carolina several technologies to treat the various groups of mixed waste at SRS. South Carolina, in conjunction with DOE, will select the technologies for mixed wastes that will be used at SRS. The technologies identified as preferred options for mixed wastes in the draft site treatment plan and their corresponding facilities will form the foundation of the SRS waste management program. To this foundation, DOE will add those technologies necessary to accommodate the types of mixed wastes that will be generated beyond 5 years.

DOE is committed to ensuring that the Waste Isolation Pilot Plant in Carlsbad, New Mexico, will comply with all applicable requirements so that DOE can place its transuranic wastes, including those at SRS, in that repository. The waste acceptance criteria for the Waste Isolation Pilot Plant will establish requirements to ensure the safe handling and preparation of transuranic waste for transportation to and placement in the repository. The technologies and facilities needed to treat transuranic wastes (primarily wastes containing plutonium-238) to meet these waste acceptance criteria were considered as necessary elements of the SRS waste management program. Because of the specific handling precautions for alpha-emitting wastes, these technologies should be located in separate facilities. TC

Additional factors used to refine the list of technologies included capacity of existing and planned facilities, life-cycle costs, and stability of final waste forms. Treatment by commercial vendors (such as offsite treatment of PCB wastes), direct disposal (disposal without treatment), and long-term storage were considered as alternatives when appropriate. Table 2-19 identifies the criteria used in the system evaluation and optimization process, and summarizes the results for the facilities considered for inclusion in the SRS waste management program.

Once the technologies had been ranked in accordance with the criteria outlined above, the treatability groups within each waste type were assigned to a specific facility until each facility reached its capacity. New facilities were added as necessary to meet capacity requirements and to provide technologies not currently available at SRS. Mixed and transuranic wastes were assigned to their respective facilities first. Hazardous waste amenable to treatment in onsite facilities that treat mixed waste were assigned to these facilities. After mixed and hazardous wastes were assigned to specific facilities, low-level wastes that could be treated in the same facilities were identified. This process continued until each waste had been assigned to a treatment, storage, or disposal facility. In the final step, secondary wastes provided by the various treatments were identified and evaluated to determine which technologies were suited for their treatment and disposal.

Table 2-20 identifies the management technologies and facilities selected for each of the alternatives considered in this EIS. The technologies selected for alternative B were identified as potential technologies for alternatives A and C as well. These potential technologies for the two alternatives were evaluated against the objective of each alternative: for alternative A, that objective was to provide a TE

Table 2-19. System evaluation/optimization criteria.[a]

Facility:	Status	Flexibility[b]	Criteria: Construction cost[c]	Volume alteration[d]	Destruction capability for organics[e]	Meets RCRA treatment requirements[f]	Leach resistance of final waste form[g]	Cost to operate[c]	Waste disposal costs[h]
Soil sort	Planned/onsite	MW[i] soils	2	NA[j]	No	No	No	2	NA-treatment req.
		LLW[k] soils	2	NA	No	NA	No	2	1
Consolidated Incineration Facility	Under construction/ onsite	MW/HW[l] liquids	7	40:1	Yes	Yes	Moderate (Cement)	6	5
		LLW liquids	7	40:1	No	NA	Moderate (Cement)	6	3
		MW/HW soils	7	1:3	Yes	Yes	Moderate (Cement)	8	7
		MW/HW job-control	7	8:1	Yes	Yes	Moderate (Cement)	8	5
		LLW job-control	7	11:1	No	NA	Moderate (Cement)	8	3
		Alpha job-control	10	11:1	No	NA	Moderate (Cement)	10	7
		Mixed alpha job-control	10	8:1	Yes	Yes	Moderate (Cement)	10	7
Supercompactor	*Existing/offsite*	*LLW job-control*	NA	8:1	No	NA	Poor (Unstabilized)	2	3
		LLW bulk	NA	8:1	No	NA	Poor (Unstabilized)	2	3
Incineration/ supercompaction	Existing/offsite	LLW job-control	NA	100:1	No	NA	Poor (Unstabilized)	8	3
Size reduction/ repackaging	Existing/offsite	LLW job-control	NA	1.4:1	No	NA	Poor (Unstabilized)	6	3
Metal melt/ *supercompaction*	Existing/offsite	LLW job-control	NA	20:1	No	NA	Moderate	8	3
Smelter	Existing/offsite	LLW bulk	NA	10:1	No	NA	Moderate	5	5
Non-alpha vitrification	Planned/onsite	MW/HW soils	7	1.2:1	Yes	Yes	Best available	8	5
		LLW soils	7	1.2:1	No	NA	Best available	8	1
		MW/HW liquids	6	75:1	Yes	Yes	Best available	7	3
		LLW liquids	6	75:1	No	NA	Best available	7	1
		MW/HW job control	7	15:1	Yes	Yes	Best available	8	3
		LLW job control	7	15:1	No	NA	Best available	8	1
		MW/HW bulk	8	15:1	Yes	Yes	Best available	9	3
		LLW bulk	8	15:1	No	NA	Best available	9	1
Transuranic waste characterization/ certification	Planned/onsite	TRU[m] (Pu-239)[n] job control	8	1.4:1	No	Meets WIPP/WAC[o]	Poor (Unstabilized)	8	10
		TRU (Pu-238)[n] job control	10	1.4:1	No	No	NA-treatment Req.	10	NA-treatment req.
		Mixed alpha[p] job control	8	1.4:1	No	Yes	Poor (Unstabilized)	8	
		Alpha job control	8	1.4:1	No	NA	Poor (Unstabilized)	8	5
		TRU (Pu-239) bulk	9	1.4:1	No	Meets WIPP/WAC[o]	Poor (Unstabilized)	8	10
		TRU (Pu-238) bulk	10	1.4:1	No	No	NA-treatment req.	10	NA-treatment req.
		Mixed alpha bulk	8	1.4:1	No	Yes	Poor (Unstabilized)	8	
		Alpha bulk	8	1.4:1	No	NA	Poor (Unstabilized)	8	5
Containment building	Planned/onsite	MW/HW Bulk	4	1:1.2	No	Yes	Poor	6	5

Table 2-19. (continued).

Facility:	Status	Flexibility[b]	Construction cost[c]	Volume alteration[d]	Destruction capability for organics[e]	Meets RCRA treatment requirements[f]	Leach resistance of final waste form[g]	Cost to operate[c]	Waste disposal costs[h]
			Criteria						
Alpha vitrification	Planned/onsite	Mixed alpha liquids	8	75:1	Yes	Yes	Best available	8	8
		Alpha liquids	8	75:1	No	NA	Best available	8	8
		TRU liquids	8	75:1	No	Yes	Best available	8	8
		Mixed alpha job control	9	15:1	Yes	Yes	Best available	9	9
		Alpha job control	9	15:1	No	NA	Best available	9	9
		TRU job control	9	15:1	No	Yes	Best available	9	9
		Mixed alpha bulk	10	15:1	Yes	Yes	Best available	10	9
		Alpha bulk	10	15:1	No	NA	Best available	10	9
		TRU bulk	10	15:1	No	Yes	Best available	10	9
Shallow land disposal	Existing/onsite	LLW	2	NA	No	No	NA	3	NA
Vault disposal	Existing/onsite	LLW	4	NA	No	No	NA	3	NA
		Alpha waste	4	NA	No	No	NA	4	NA
RCRA disposal	Existing/onsite	MW/HW	5	NA	No	No	NA	3	NA
		Mixed alpha waste	5	NA	No	No	NA	4	NA
WIPP disposal	Existing/offsite	TRU	NA	NA	No	No	NA	NA	NA

a. Source: Hess (1994g, 1995d).
b. Denotes the waste types and matrices that could be managed at the facility.
c. Cost scores are on a 1 to 10 scale with 10 being the most expensive.
d. Denotes the ratio of the incoming waste volume to the post-treatment waste volume.
e. Denotes whether the facility provides a destruction and removal capability for organic hazardous constituents that meets RCRA incineration standards (i.e., 99.99 percent).
f. Denotes whether the facility provides treatment that meets RCRA land disposal restriction standards.
g. Ranks the stability of the final waste form provided by the technology(ies) used at each facility.
h. Scores the cost to dispose of the treatment residuals and secondary wastes on a 1 to 10 scale with 10 being the most expensive.
i. Mixed waste.
j. Not applicable.
k. Low-level waste.
l. Hazardous waste.
m. Transuranic waste.
n. Plutonium-238, -239.
o. Waste Isolation Pilot Plant waste acceptance criteria.
p. Waste containing between 10 and 100 nanocuries per gram of transuranic radionuclides.

Table 2-20. Treatability groups and the proposed management facilities for each alternative.[a]

Waste	Categories	Treatment, storage, and disposal facility[b,c]					
		Vault disposal	Shallow land disposal	Storage	Compaction; Offsite vendor[d]	Non-alpha vitrification	Incineration
		Alternative	Alternative	Alternative	Alternative	Alternative	Alternative
Low-level	Long-lived			A B C			
Low-level	Spent deionizers			A B C			
Low-level	Tritiated equipment	A B				C	
Low-level	Tritiated job-control waste	A B				C	B
Low-level	Tritiated soil	A B				C	
Low-level	Naval hardware		A B C				
Low-level	Low-activity equipment	A B C			B		
Low-level	Offsite job-control waste	A B				C	
Low-level	Low-activity job-control waste	A B			A B	C	B
Low-level	Intermediate-activity job-control waste	A B				C	
Low-level	Suspect soil	B	A B			C	
Low-level	Low-activity soil	A B	B			C	
Transuranic/ Alpha	Alpha job-control waste	A B					C
Mixed waste	Glass debris					C	
Mixed waste	Heterogeneous debris					C	B
Mixed waste	Lead					C	
Mixed waste	Inorganic debris					C	B
Mixed waste	Organic debris					C	B
Mixed waste	Mixed waste needing size reduction					C	A B
Mixed waste	DWPF[e] benzene					C	A B
Mixed waste	Organic liquid					C	A B
Mixed waste	Radioactive oil					C	A B
Mixed waste	PUREX[f] solvents					C	A B
Mixed waste	Paint wastes					C	A B
Mixed waste	Composite filters					C	A B
Mixed waste	Aqueous liquids					C	A B
Mixed waste	Soils					B C	A
Mixed waste	Organic sludge					B C	A
Mixed waste	Inorganic sludge					B C	A
Mixed waste	Mercury-contaminated materials					C	
Mixed waste	Tritiated oil			A B C			
Hazardous waste	Composite filters					C	A B
Hazardous waste	Paint wastes					C	A B
Hazardous waste	Organic liquids					C	A B
Hazardous waste	Aqueous liquids					C	A B
Hazardous waste	Inorganic debris					C	B
Hazardous waste	Heterogeneous debris					C	B
Hazardous waste	Glass debris					C	
Hazardous waste	Organic sludges					C	B
Hazardous waste	Inorganic sludges					C	B
Hazardous waste	Soils					C	
Hazardous waste	Organic debris					C	B

Table 2-20. (continued).

Waste	Categories	Treatment, storage, and disposal facility[g]							
		WIPP disposal[h]	Alpha vitrification	Smelting	Containment Building	M-Area vendor	Offsite treatment	RCRA[i] disposal	
		Alternative	Alternative	Alternative	Alternative	Alternative	Alternative	Alternative	
Low-level	Low-activity equipment			B C					
Transuranic/ Alpha	Alpha job-control waste		C						
Transuranic/ Alpha	Mixed alpha job-control waste		B C					A B	
Transuranic	<0.5 curie TRU[j] job-control waste	A B	B C						
Transuranic	<0.5 curie mixed TRU job-control waste	A B	B C						
Transuranic	>0.5 curie TRU job-control waste	A B	B C						
Transuranic	>0.5 curie mixed TRU job-control waste	A B	B C						
Transuranic	TRU equipment	A B	B C						
Transuranic	TRU equipment, mixed	A B	B C						
Transuranic	Remote and mixed remote TRU	A B	B C						
Mixed waste	Glass debris				A B				
Mixed waste	Metal debris				A B C				
Mixed waste	Bulk				A B C				
Mixed waste	Lead				A B		A B C		
Mixed waste	Heterogeneous debris				A B				
Mixed waste	Inorganic debris				A B				
Mixed waste	Organic debris				A B				
Mixed waste	Composite filters				A				
Mixed waste	PCBs						A B C		
Mixed waste	Elemental mercury				C		A B		
Mixed waste	Waste site soil					A B C			
Mixed waste	Uranium/chromium					A B C			TC
Mixed waste	M-Area waste					A B C			
Mixed waste	Silver saddles							A B C	
Mixed waste	Gold traps							A B C	
Mixed waste	Safety/control rods							A B C	
Mixed waste	ITP[k] Filters							A B C	TE
Mixed waste	Process equipment							A B C	
Hazardous waste	PCBs						A B C		
Hazardous waste	Inorganic debris						A B		
Hazardous waste	Heterogeneous debris						A B		
Hazardous waste	Metal debris				C		A B		
Hazardous waste	Bulk equipment				C		A B		
Hazardous waste	Glass debris						A B		
Hazardous waste	Organic sludges						A		TC

Table 2-20. (continued).

Waste	Categories	Treatment, storage, and disposal facility[g]						
		WIPP disposal[h]	Alpha vitrification	Smelting	Containment Building	M-Area vendor	Offsite treatment	RCRA[i] disposal
		Alternative	Alternative	Alternative	Alternative	Alternative	Alternative	Alternative
TC Hazardous waste	Inorganic sludges						A	
Hazardous waste	Soils						A B	
TE Hazardous waste	Organic debris						A B	
Hazardous waste	Lead				C		A B	

a. Source: Hess (1994e, 1995d).
b. Storage includes wastes stored for radioactive decay and wastes stored pending further analysis to determine their ultimate disposition.
c. Disposal includes wastes sent directly to a disposal unit without treatment.
d. "Compaction" refers to the use of the existing onsite compactors under alternative A for low-activity job-control waste. "Offsite vendor" refers to those technologies to be used under alternative B for low-activity job-control and equipment wastes as a result of the request for proposal for low-level waste volume reduction. For purposes of analysis in the EIS, these technologies are assumed to include supercompaction, size reduction/repackaging, incineration/supercompaction, and metal melt/supercompaction. TC
e. Defense Waste Processing Facility.
f. Plutonium-uranium extraction.
g. Note change in header to show different waste treatment, storage, and disposal processes from first page.
h. Waste Isolation Pilot Plant.
i. Resource Conservation and Recovery Act.
j. Transuranic.
k. In-Tank Precipitation.

limited treatment configuration; for alternative C, it was to provide an extensive treatment configuration. The treatability group was then assigned to the technology most suited to that treatability group, in keeping with the overall objective of the alternative. For example, mixed waste in the treatability group
TE "heterogeneous debris" would be macroencapsulated (see glossary) at the containment building (see Appendix B.6) in alternative A, incinerated or macroencapsulated in alternative B, and vitrified in alternative C.

2.3.4 NEPA ANALYSES FOR FACILITIES CONSIDERED IN THE SRS WASTE MANAGEMENT EIS

The no-action alternative described in the Notice of Intent to prepare this EIS for Waste Management at SRS (59 FR 16494, April 6, 1994) indicated that DOE would "analyze a no-action alternative that would continue waste generation and current management practices. DOE would continue ongoing activities and implement planned actions, including high-level radioactive waste management, for which National Environmental Policy Act review has been completed and decisions made." The proposed action would include "the no-action alternative activities plus programmatic and project-level actions to enhance waste management operations" at SRS.

On this basis, DOE formulated a no-action alternative and three "action" alternatives; the action alternatives could fulfill DOE's need for a waste management strategy. This EIS provides information for decisions DOE will make in its Records of Decision following publication of the EIS. Table 2-21 lists existing and planned facilities that are included in the no-action and the action alternatives. In addition, the table identifies the NEPA basis for including planned activities in the no-action alternative, facilities that could be constructed and operated under decisions based on this EIS, and facilities that might require further NEPA evaluations. TE

Table 2-21. NEPA review of facilities in the *SRS Waste Management EIS.*

Facility	NEPA review	Discussion
Containment Building (Hazardous Waste/Mixed Waste Treatment Building)	This EIS	
Low-Level Waste Soil Sort Facility	This EIS	
Consolidated Incineration Facility (CIF) - Construction	Consolidated Incineration Facility (DOE/EA-0400) and its Finding of No Significant Impact (57 FR 61402)	Construction of the CIF would continue under the no-action alternative.
Consolidated Incineration Facility (CIF) - Operation	This EIS	The action alternatives explore a wide range of operational scenarios for the CIF. Decisions on whether to operate and what wastes to treat would be based on this EIS.
Replacement High Level Waste Evaporator (RHLWE)	Categorical exclusion, September 24, 1990	
New Waste Transfer Facility (NWTF)	Categorical exclusion, September 18, 1991	The NWTF, a replacement "valve box" located in H-Area, receives waste from both the Defense Waste Processing Facility (DWPF) and other F- and H-Area operations.
M-Area Vendor Treatment Facility	Additional waste streams-this EIS	The original M-Area Vendor Treatment Facility was addressed in *Environmental Assessment, Treatment of M-Area Mixed Waste at the Savannah River Site,* which assessed the treatment of six mixed wastes. In this EIS, DOE proposes to use this facility for the treatment of two more mixed waste streams that were identified in the *SRS Draft Site Treatment Plan.* The treatment technology would be vitrification. TC

Table 2-21. (continued).

Facility	NEPA review	Discussion
M-Area Air Stripper	Ongoing activity	The M-Area Air Stripper treats the M-Area groundwater plume that is contaminated with organic solvents as part of environmental restoration. Under the four alternatives, DOE would continue to treat, in the M-Area Stripper, the waste withdrawn from monitoring wells during sampling (investigation-derived waste).
F/H-Area Effluent Treatment Facility	Memo-to-File, *F/H Effluent Treatment Facility (ETF)*, August 12, 1986	The NOI for the DWPF SEIS (59 FR 16499, April 6, 1994) states that operation of the ETF will be included in the Waste Management EIS. NEPA was completed under then-current DOE NEPA Guidelines.
Hazardous Waste/Mixed Waste Disposal Vaults	*Final Environmental Impact Statement, Waste Management Activities for Groundwater Protection*, DOE/EIS-0120 and its Record of Decision (53 FR 7557))	The EIS assessed RCRA landfills and vaults for disposal of hazardous and mixed waste. Specific project-level actions listed under *Decision* in the Record of Decision included construction and operation of new storage/disposal facilities for hazardous and/or mixed waste.
High-Level Waste Tank Farms	EISs on high-level waste include: *Final Environmental Impact Statement, Waste Management Operations* (ERDA-1537); *Final Environmental Impact Statement, Double-Shell Tanks for Defense High-Level Radioactive Waste Storage*; and *Final Environmental Impact Statement, Defense Waste Processing Facility*, DOE/EIS-0082 and its Supplemental EIS (DOE/EIS-0082S)	
TC E-Area Vaults	DOE/EIS-0120 and its Record of Decision (53 FR 7557)	Vault design was one of several project-specific technologies considered for new disposal/storage facilities.
Shallow Land Disposal	ERDA-1537 and subsequent confirmation in DOE/EIS-0120	Shallow land disposal has continued in the operating burial ground and would continue in E-Area for a portion of SRS low-level waste (e.g., suspect soil). TC
E-Area Burial Ground Solvent Tanks	Ongoing activity	Existing solvent tanks store spent solvent generated by the plutonium-uranium extraction (PUREX) process.
Transuranic Waste Storage Pads	Ongoing activity	Under the no-action and the action alternatives, DOE would construct additional pads to increase the storage capacity. The number of pads needed would be greatest under the no-action alternative and least under alternative A. TC

Table 2-21. (continued).

Facility	NEPA review	Discussion
Mixed Waste Storage Facilities	Categorical exclusion, October 5, 1990	
M-Area Liquid Effluent Treatment Facility (LETF)	Ongoing activity	
Savannah River Technology Center Mixed Waste Storage Tanks	Ongoing activity	
Experimental Transuranic Waste Assay Facility/ Waste Certification Facility (ETWAF)	Ongoing activity	
Hazardous Waste Storage Facilities	Ongoing activity	Under the no-action alternative, hazardous wastes would continue to be sent offsite for treatment and disposal. Therefore, additional hazardous waste storage would not be required.
Compactors	Ongoing activity	Under no-action and alternative A, the existing compactors operate over the full period of analysis. Under alternatives B and C, they would be replaced by other volume-reducing technologies.
Long-Lived Waste Storage Building	DOE/EIS-0120	
Transuranic Waste Characterization/ Certification Facility	Would require further NEPA evaluation	The transuranic waste characterization/ certification facility would provide extensive containerized waste processing and certification capabilities. The facility would have the ability to open various containers (e.g., boxes, culverts, or drums); assay, examine, sort, decontaminate the alpha and transuranic wastes; reduce large wastes to 55-gallon-drum size; weld; and certify containers for disposal.
Non-Alpha Vitrification	Would require further NEPA evaluation	The non-alpha vitrification facility would provide treatment for liquid, solid, soil, and sludge wastes, primarily resulting from environmental restoration and decontamination and decommissioning activities, for which treatment capacity is not otherwise available at SRS. For the expected waste forecast, the facility would be constructed and operated under alternatives B and C. Because conceptual designs have not been developed, DOE believes that further NEPA evaluation might be required.

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Table 2-21. (*continued*).

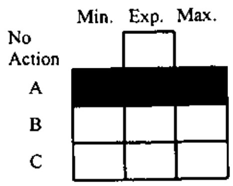
Facility	NEPA review	Discussion
Alpha Vitrification	Would require further NEPA evaluation	The alpha vitrification facility would provide treatment of non-mixed and mixed alpha waste (10 to 100 nanocuries of transuranics per gram of waste) and nonmixed and mixed transuranic waste (greater than 100 nanocuries of transuranics per gram of waste). The facility would have the ability to open drums of wastes, perform size reduction, produce a glass waste form suitable for disposal, and treat secondary wastes. The facility would be constructed and operated under alternatives B and C. Similar to the non-alpha vitrification facility, the alpha vitrification facility is in a pre-conceptual design stage and DOE believes that further NEPA evaluation would be required.

TE

2.4 Alternative A – Limited Treatment Configuration

As described at the beginning of Chapter 2, DOE bases alternative A on a strategy to provide limited treatment, generally the minimum treatment required to meet applicable storage and disposal standards. This section discusses the activities and facilities that would be used under alternative A and the expected waste forecast, and discusses the changes in such activities and facilities that would be required to accommodate the minimum and maximum waste forecasts. Under alternative A, DOE would use technologies that provide the minimum treatment required to meet applicable storage and disposal standards and would expeditiously store or dispose of the wastes in a manner that prevents or minimizes short-term impacts. TE

Alternative A is identical to the no-action alternative with respect to the management of liquid high-level and low-level radioactive wastes. This section discusses only changes, if any, for these wastes necessary to accommodate the minimum and maximum waste forecasts. Alternative A would use several treatment facilities for mixed and transuranic wastes including the Consolidated Incineration Facility, a mobile soil sort facility, the containment building for mixed wastes, and the transuranic waste characterization/certification facility for transuranic and alpha wastes. Small quantities of hazardous waste would be treated onsite at the Consolidated Incineration Facility. By implementing these treatments, DOE would appreciably decrease the amount of additional storage capacity for mixed and transuranic wastes from that required under the no-action alternative. Mixed waste storage would peak in 2005 and transuranic and alpha waste storage in 2006; the required number of storage facilities would then decrease as new treatment facilities begin operations. Small quantities of mixed and PCB wastes would be sent offsite for treatment, and transuranic wastes would be sent to the Waste Isolation Pilot Plant for disposal when that facility becomes available. The waste volumes sent to shallow land disposal and to RCRA-permitted disposal facilities would increase from those projected for the no-action alternative, due to the increased volume of treatment residuals. Sections 2.4.4, 2.4.5, and 2.4.6 discuss the proposed treatment, storage, and disposal activities for hazardous, mixed, and transuranic wastes under alternative A. Section 2.4.7 summarizes the activities and facilities under alternative A and compares them to those that would be required under the no-action alternative. TE TE TC TE



2.4.1 POLLUTION PREVENTION/WASTE MINIMIZATION

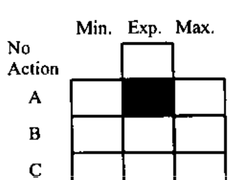
The ongoing waste minimization activities described for the no-action alternative (Section 2.2.1) would continue in each waste forecast under alternative A. DOE would also initiate activities to reduce the amounts of lead and contaminated soils. Table 2-22 summarizes waste minimization activities that would occur under alternative A beyond the ongoing (no-action alternative) activities.

Table 2-22. Waste minimization activities for alternative A.[a]

TC

Minimization activity	Treatability group	Waste forecast	Estimated amount of reduction (cubic meters)[b]
Reuse decontaminated lead	Mixed waste lead	Expected	2,408
		Minimum	1,053
		Maximum	6,140
Sort soil to divert for beneficial reuse	Mixed waste soils	Expected	35,332
		Minimum	9,549
		Maximum	176,024

a. Source: Hess (1994e, 1995c).
b. To convert to cubic feet, multiply by 35.31.

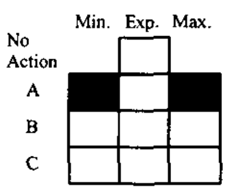


2.4.1.1 Pollution Prevention/Waste Minimization – Expected Waste Forecast

TC DOE estimates that 3,010 cubic meters (1.06×10^5 cubic feet) of radioactively contaminated lead (a
TE mixed waste) would be generated and available for recycling over the next 30 years (Hess 1995c). Lead that cannot be decontaminated (i.e., lead that is radioactive throughout its volume due to activation rather than contaminated only on its surface) would be treated and disposed of onsite rather than recycled because the onsite lead smelter can only be used for uncontaminated lead.

Lead with surface contamination would be sent offsite for decontamination at an existing commercial facility (see Appendix B.21). After decontamination, the lead would be checked for radioactivity. Lead that had been adequately decontaminated would be sold to private industry for reuse. Lead that was not adequately decontaminated would be returned to SRS for disposal. The small amount of waste generated during the decontamination process also would be disposed of at SRS. It is estimated that more than 80 percent [2,408 cubic meters (85,000 cubic feet)] of the lead generated over the next 30 years could be recycled (DOE 1994d). TC

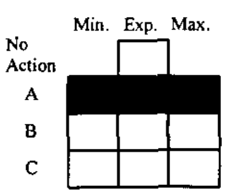
The volume of soils containing mixed waste would be minimized by separating the contaminated materials from those in which the contamination cannot be detected. An estimated 88,331 cubic meters (3.12×10^6 cubic feet) of mixed waste soils would be generated over the 30-year period. An estimated 35,332 cubic meters (1.25×10^6 cubic feet) of this material is expected to be below detection limits (Hess 1995c). Material free of detectable contaminants would be used at SRS for backfill. The soil sort facility is described in Appendix B.28. TC TE



2.4.1.2 Pollution Prevention/Waste Minimization – Minimum and Maximum Waste Forecasts

For alternative A – minimum and maximum forecasts, lead with radioactive contamination limited to the surface would be recycled as in the expected forecast, but the volume of throughput and decontaminated lead available for reuse would vary, as indicated in Table 2-22.

Mixed waste soils would be sorted to divert uncontaminated material for beneficial uses. The estimated amounts expected to be free of detectable contamination and available for reuse in the minimum and maximum waste forecasts are presented in Table 2-22. TE



2.4.2 HIGH-LEVEL WASTE – EXPECTED, MINIMUM, AND MAXIMUM FORECAST TE

Under alternative A, DOE would treat liquid high-level radioactive waste as it would be treated under the no-action alternative (see Section 2.2.2, Figure 2-9). For each waste forecast, DOE would continue current management activities, from receipt and storage of liquid high-level waste in tanks to preparation, processing, and treatment into forms suitable for final disposal. The high-level waste volumes that would be generated over the next 30 years (Table 2-22) in addition to the existing inventory of high-level waste currently in storage [approximately 1.31×10^5 cubic meters (3.45×10^7 gallons)] (DOE 1994d) are given in Table 2-23.

TE | **Table 2-23.** Thirty-year liquid high-level waste volumes for the expected, minimum, and maximum waste forecasts.[a]

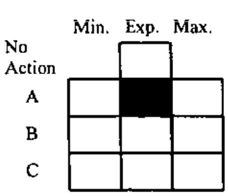
Waste forecast	Volume
Expected	22,000 cubic meters (5.81×10^6 gallons)
Minimum	12,000 cubic meters (3.17×10^6 gallons)
Maximum	27,000 cubic meters (7.13×10^6 gallons)

a. Source: Hess (1994d).

These volumes are not additive, because newly generated waste volumes would be reduced approximately 75 percent via evaporation. These volumes would not require construction of new high-level waste tanks or facilities. Instead, DOE proposes to continue current management practices and to manage waste with the objective of emptying the tanks and immobilizing SRS's inventory of liquid high-level waste by 2018 (DOE 1994a).

TE DOE would not change proposed high-level waste management practices as a result of the smaller volumes forecast in the minimum waste forecast (45 percent less than the expected waste forecast). The only difference in management practices as a result of the larger volumes forecast in the maximum waste forecast (23 percent more than the expected waste forecast) would be to operate the existing evaporators at higher rates to maintain adequate reserve tank storage capacity.

2.4.3 LOW-LEVEL WASTE



2.4.3.1 Low-Level Waste – Expected Waste Forecast

For alternative A – expected forecast, DOE would process low-level waste in a manner identical to the no-action alternative discussed in Section 2.2.3. Figure 2-17 summarizes these proposed activities to manage low-level waste.

Under alternative A, DOE would store process water deionizers from reactors (less than 1 percent of the forecast low-level waste) in long-lived waste storage buildings in E-Area. The existing building would

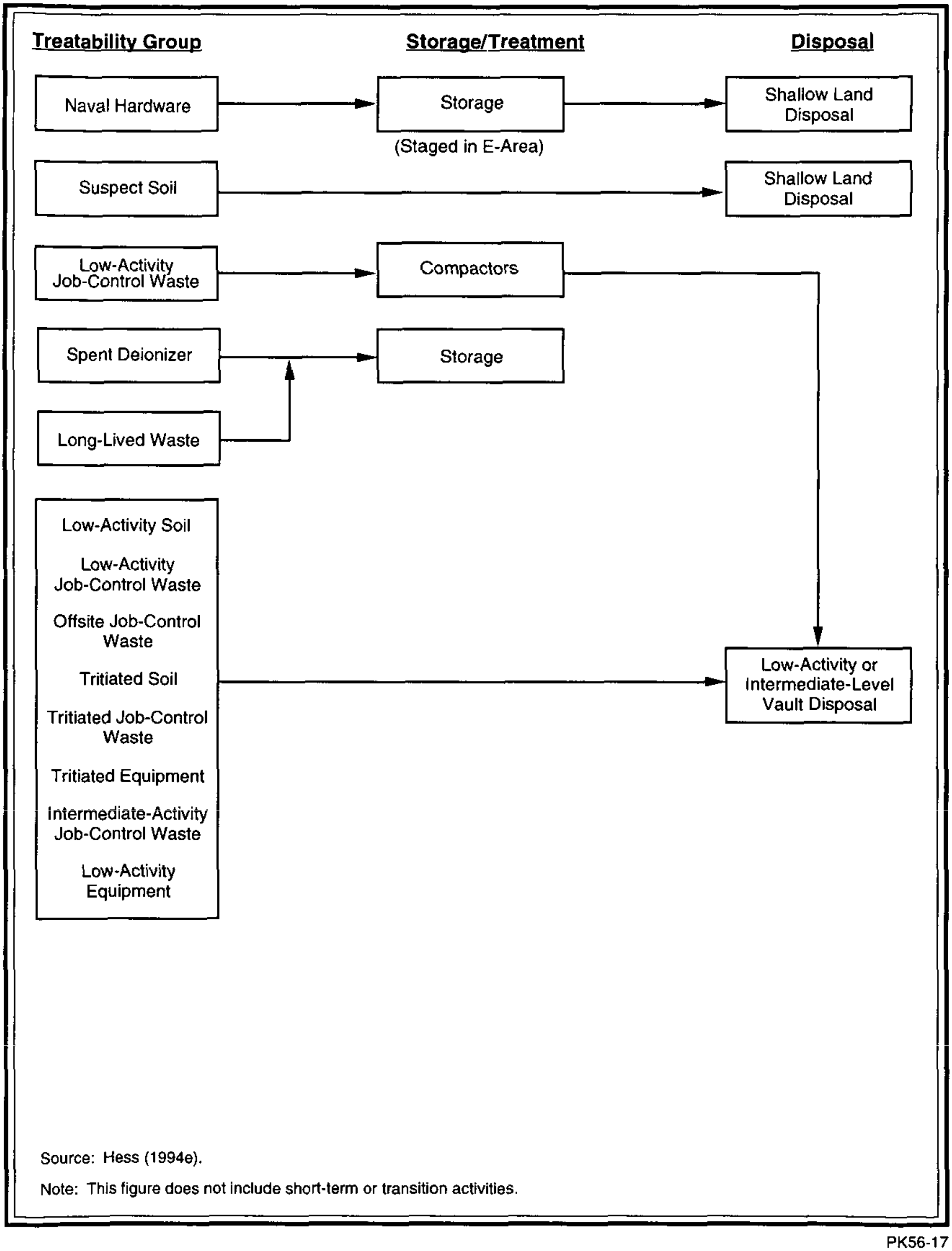


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Figure 2-17. Low-level waste management plan for alternative A expected waste forecast.

reach capacity by 2000, and 24 additional buildings would be needed over the 30-year period (Hess
TC 1995c).

DOE would compact low-activity job-control waste to more efficiently use capacity. For purposes of analysis in this EIS, it is assumed that approximately 1.19×10^5 cubic meters (4.22×10^6 cubic feet)
TC TE (22 percent of the low-level waste forecast) would be compacted over the next 30 years. See Section 2.2.3.1 for additional information. Compacting the waste would decrease needed disposal capacity to
TC TE 78 percent of that required if waste were not compacted (Hess 1995c).

TE Table 2-24 lists the distribution of low-level waste among the various treatment and disposal options.

TE **Table 2-24.** Low-level waste treatment and disposal options for alternative A expected waste forecast.[a,b]

TC

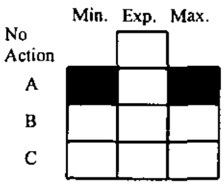
Disposal options	Treatment options
93 percent to vaults	22 percent to compactor
7 percent to shallow land disposal	

TE a. Source: Hess (1995c).
b. Percentages are approximate.

TE DOE would continue to dispose of suspect soils in the engineered low-level trench. Under alternative A, DOE would dispose of low-activity waste, which comprises approximately 86 percent by volume of the low-level waste that would be disposed of, in the low-activity waste vaults. The material disposed of would include low-activity waste equipment resulting from the decontamination of mixed waste (discussed in Section 2.4.5.1.2). The existing vault would reach capacity by 1997 (Hess 1995c). Additional vaults would be constructed as needed. See Section 2.2.3.1 for additional information.

TC Under alternative A, DOE would dispose of intermediate-activity waste, which comprises approximately 7 percent of the waste that would be disposed of, in the intermediate-level waste vaults. The existing vaults would reach capacity by 2000, and additional vaults would be constructed as needed (Hess 1995c). See Section 2.2.3.2 for additional information.

Under alternative A, DOE would dispose of suspect soils and naval hardware that meet waste acceptance criteria, which would comprise approximately 7 percent of the low-level waste to be disposed of, by shallow land disposal (Hess 1995c). See Sections 2.2.3.1 and 2.2.3.4 for additional information.



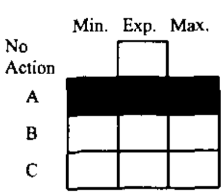
2.4.3.2 Low-Level Waste – Minimum and Maximum Waste Forecasts

For alternative A – minimum and maximum waste forecasts, DOE would change the way it manages some low-level waste in the expected case (see Figure 2-17). The changes from waste management practices described under the expected waste forecast are primarily attributed to the larger volume of soils in the maximum waste forecast (48 percent of all low-level waste, compared to 9 percent for the expected waste forecast). The existing compactors would operate at maximum capacity for the duration of the 30-year period and would process approximately 30 percent of the total volume of low-level waste in the minimum case and 7 percent in the maximum case. Less than 1 percent would be placed in storage buildings pending disposal (Hess 1995c). Table 2-25 describes the percentage of low-level waste distributed among the various treatment and disposal options under the minimum and maximum waste forecasts. TE TC

Table 2-25. Low-level waste treatment and disposal options for alternative A minimum and maximum waste forecasts.[a,b]

Minimum waste forecast	Maximum waste forecast	
Treatment options	Treatment options	
30 percent to compactors	7 percent to compactors	
Disposal options	Disposal options	
95 percent to vaults	69 percent to vaults	TC
5 percent to shallow land disposal	31 percent to shallow land disposal	

a. Source: Hess (1995c).
b. Percentages are approximate.



2.4.4 HAZARDOUS WASTE – EXPECTED, MINIMUM, AND MAXIMUM WASTE FORECASTS TE

For each alternative A waste forecast, DOE would manage hazardous waste in a manner similar to the no-action alternative for hazardous waste presented in Section 2.2.4. The only difference would be to incinerate a few treatability groups onsite rather than sending them offsite for treatment and disposal. TE

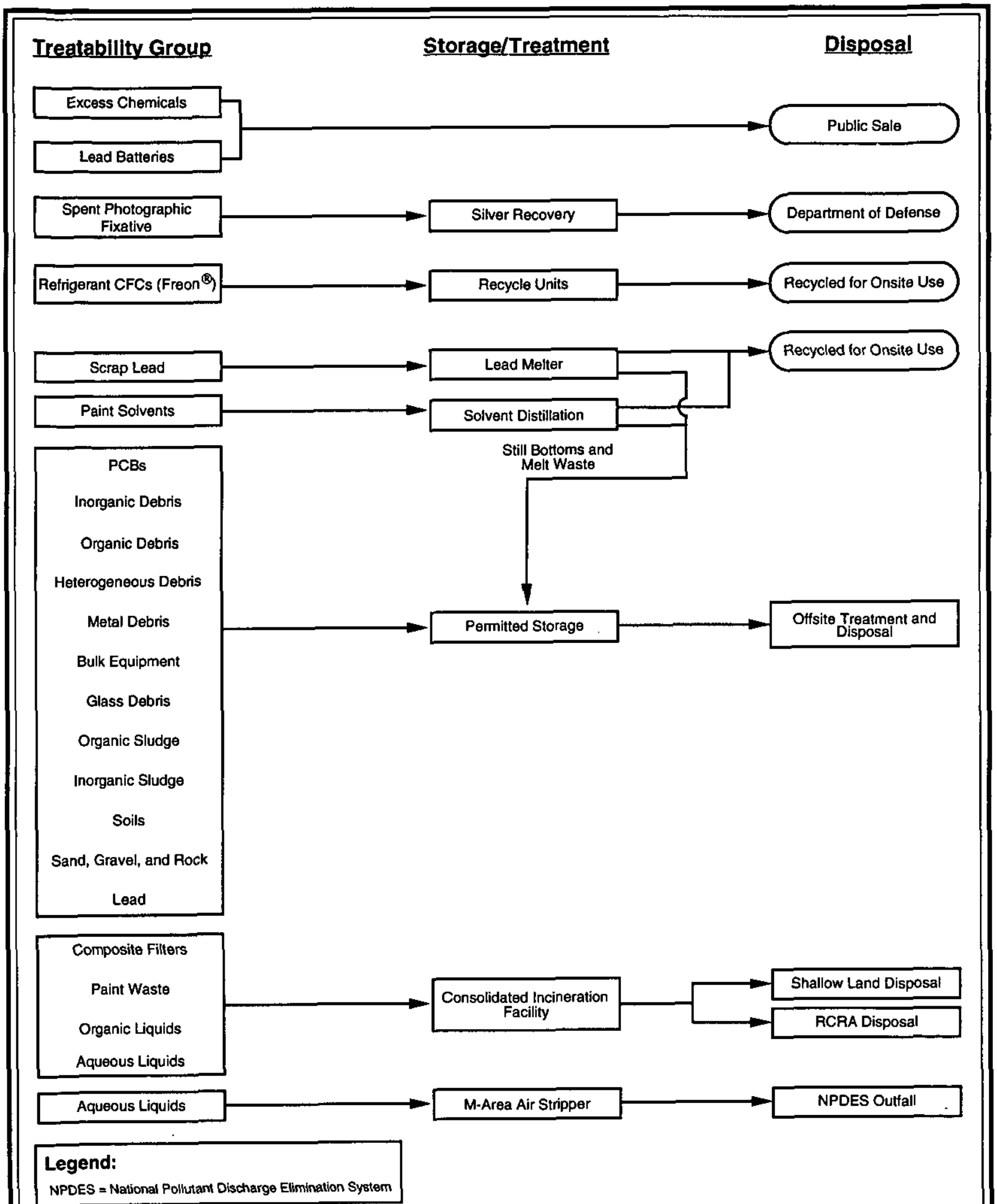
Figure 2-18 presents these proposed hazardous waste management activities. In general, DOE would not construct new facilities or implement new onsite treatment processes solely for hazardous wastes. Rather, hazardous waste management alternatives would be based on the alternatives suggested for mixed waste. If DOE constructs a facility or implements a method of treatment for mixed waste that can also be applied to hazardous waste, DOE could use it for hazardous waste to the extent excess capacity is available.

In addition to the management practices for hazardous waste under the no-action alternative (Section 2.2.4), under alternative A DOE would:

- Complete construction of and operate the Consolidated Incineration Facility, including incineration of selected hazardous wastes.

- Construct RCRA-permitted disposal vaults to dispose of stabilized ash and blowdown waste from the incineration process, or send them to shallow land disposal.

Under alternative A, DOE would continue to accumulate hazardous wastes for recycling, both onsite and offsite. DOE would continue to manage aqueous liquids generated from groundwater monitoring wells (investigation-derived wastes) at the M-Area Air Stripper, as described in Section 2.2.4. DOE would also continue storing hazardous waste in the three RCRA-permitted hazardous waste storage buildings, the M-Area storage building, and on the three interim status solid waste storage pads. DOE would
TC continue to send most (89 percent for expected, 93 percent for minimum, and 91 percent for maximum waste forecasts) of the hazardous waste offsite for treatment and disposal. However, several hazardous wastes (composite filters, paint waste, organic liquids, aqueous liquids) would be treated in the Consolidated Incineration Facility, assuming it begins operating in 1996. These wastes represent approximately 4 percent of the hazardous waste quantities forecast for the next 30 years. The stabilized ash and blowdown from the Consolidated Incineration Facility would be sent to onsite RCRA-permitted disposal or shallow land disposal. It is estimated that 70 percent of the stabilized ash and blowdown would require RCRA-permitted disposal and 30 percent would be sent to shallow land disposal (Hess 1995c).



Source: Hess (1994e).

Note: This figure does not include short-term or transition activities.

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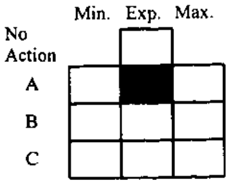
Figure 2-18. Hazardous waste management plan for alternative A expected waste forecast.

2.4.5 MIXED WASTE



2.4.5.1 Mixed Waste – Expected Waste Forecast

For the expected forecast of waste generation, DOE would manage mixed waste to include activities under the no-action alternative presented in Section 2.2.5. In addition, under alternative A, DOE would implement limited mixed waste treatment activities necessary to provide a final waste form that would be suitable for disposal. Figure 2-19 summarizes the proposed mixed waste management activities under this alternative. In addition to the waste management practices for mixed waste under the no-action alternative, under alternative A DOE would:

- Store tritiated oils to allow time for radioactive decay.

TC

- Send elemental mercury and mercury-contaminated waste to the Idaho National Engineering Laboratory for treatment; residuals would be returned to SRS for RCRA-permitted disposal or shallow land disposal.

TC

- Send calcium metal waste to the Los Alamos National Laboratory for treatment; residuals would be returned to SRS for shallow land disposal.

- Send radioactive PCB wastes offsite for treatment; residuals would be returned for shallow land disposal at SRS.

- Send lead offsite for decontamination and recycling; residuals would be returned for RCRA-permitted disposal at SRS.

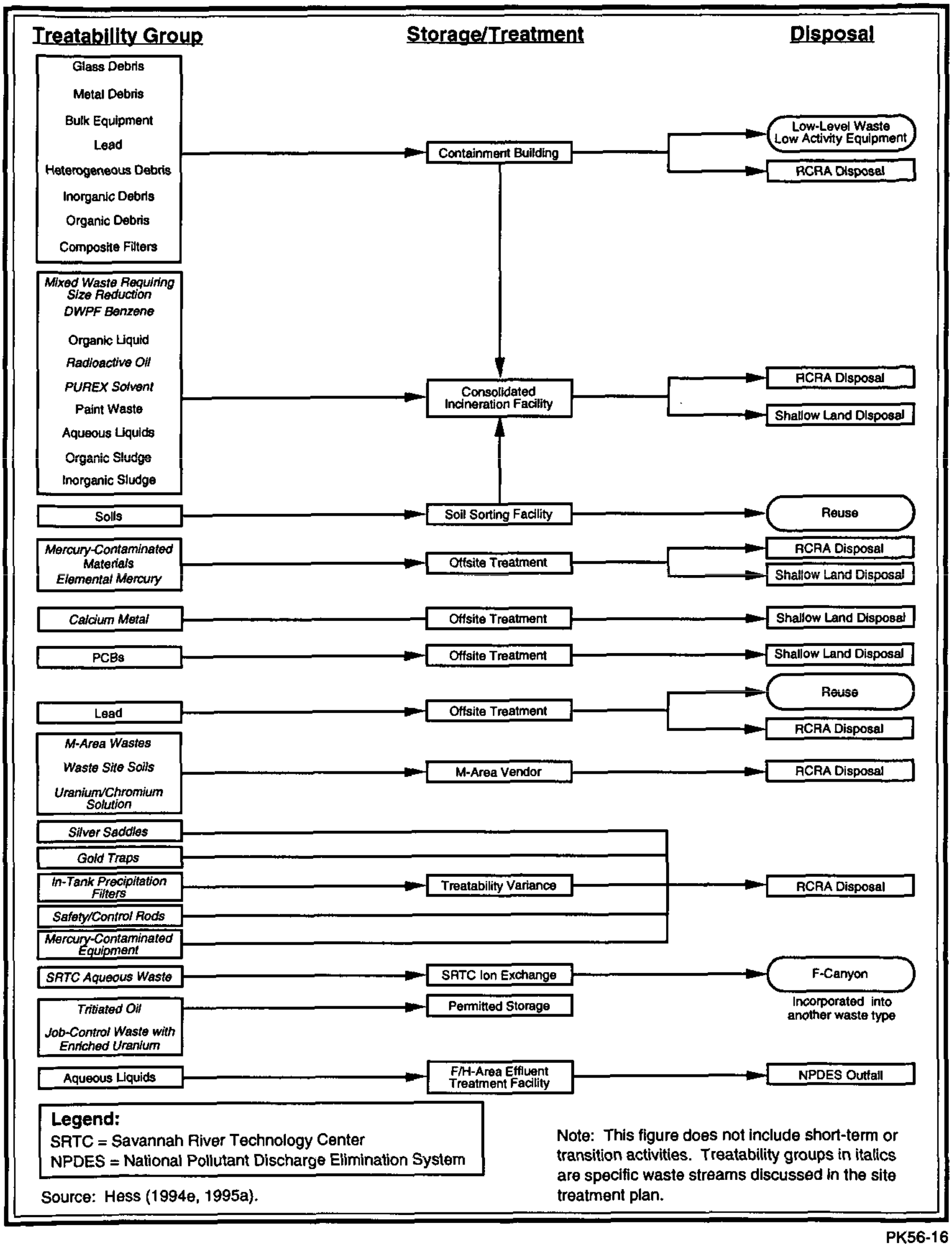


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Figure 2-19. Mixed waste management plan for alternative A expected waste forecast.

In addition, under alternative A, DOE would:

- Construct a containment building to decontaminate mixed wastes (mostly debris) and macroencapsulate contaminated debris and lead wastes.

- Operate the Consolidated Incineration Facility and burn certain mixed wastes, such as benzene generated by the Defense Waste Processing Facility, organic and aqueous liquid wastes, contaminated soils, spent decontamination solutions from the containment building, PUREX (plutonium-uranium extraction) solvent, paint waste, radioactive oil, and organic and inorganic sludges.

- Construct RCRA-permitted disposal vaults to dispose of stabilized ash and blowdown from the incineration process or send them to shallow land disposal.

- Construct and operate a soil sort facility to separate soil with undetectable contamination from contaminated soil. Contaminated soil would be burned in the Consolidated Incineration Facility TE and soil without detectable contamination would be used onsite as backfill material.

- Construct and operate the M-Area Vendor Treatment Facility to vitrify wastes generated by TE M-Area electroplating operations and the specific wastes identified in the *SRS Proposed Site Treatment Plan*.

2.4.5.1.1 Containerized Storage

For alternative A – expected waste forecast, DOE would continue to store mixed waste in the three mixed waste storage buildings, the M-Area storage building, and on three waste storage pads. The non-alpha mixed waste (i.e., waste with less than 10 nanocuries per gram of transuranics) that is now stored on the transuranic waste storage pads would be transferred to the mixed waste storage pads. To allow for storage of mixed waste while treatment facilities are being constructed, DOE would build additional mixed waste storage buildings as needed. Based on the usable capacity of Building 643-43E
TC described in Section 2.2.5.1, DOE estimates that a maximum of 79 additional buildings would be
TE required by 2005 (Hess 1995c). Due to their small size (Building 643-29E) or remote locations (Buildings 645-2N and 316-M), DOE would no longer use the existing mixed waste storage buildings after their waste inventories were removed for treatment and disposal. If these existing mixed waste storage buildings were used for future storage needs, their combined storage capacities would offset the need for approximately one new storage building.

DOE would continue to store mercury-contaminated tritiated oils generated by SRS tritium facilities in the mixed waste storage buildings. Due to the high tritium content of these oils, DOE determined that the tritiated oil would need to be stored for an extended period to allow the tritium (with a half-life of about 10 years) to decay to manageable levels. DOE is investigating the possibility of treating the tritiated oil with a mobile packed bed reactor currently under development at Los Alamos National Laboratory. The reactor is a mobile unit that DOE could transport to SRS and operate within a containment building. DOE would continue to store the tritiated oil for decay pending Los Alamos National Laboratory's development of the packed bed reactor or other technology (WSRC 1995). For purposes of this EIS, it is assumed that DOE would continue to store radioactive oils with high tritium content for the duration of the 30-year analysis period. TC

In the draft EIS, DOE proposed to send job-control wastes contaminated with solvents and enriched uranium to the Consolidated Incineration Facility. DOE has determined that this treatment could concentrate the uranium in the incinerator ash at levels that could result in an unplanned nuclear reaction. DOE is currently investigating alternate treatments for this waste, such as reprocessing the materials to recover the uranium or macroencapsulation. Additionally, the initial characterization of these materials was conservative and DOE believes that chemical analyses and further review of documentation regarding the composition of the waste may result in reclassification as nonhazardous low-level waste rather than mixed waste (WSRC 1995). The EIS assumes that this material (approximately 260 cubic meters) will remain in permitted storage pending recharacterization or the development of an appropriate treatment technology. TC

2.4.5.1.2 Treatment and/or Tank Storage

For alternative A – expected waste forecast, DOE would continue treatment and tank storage practices for Savannah River Technology Center aqueous wastes and PUREX solvent waste, as described in Section 2.2.5.2. In addition, the 568-cubic-meter (150,000-gallon) Organic Waste Storage Tank would be used under this case for storing mixed organic waste generated by the Defense Waste Processing Facility. DOE would treat this waste at the Consolidated Incineration Facility, assuming it begins operating in 1996. Assuming the Consolidated Incineration Facility operates, additional tank storage capacity would not be required. TE

DOE would continue to use the M-Area Process Waste Interim Treatment/Storage Facility tanks to store concentrated mixed wastes from the M-Area Liquid Effluent Treatment Facility. DOE plans to treat six types of waste currently stored in the Process Waste Interim Treatment/Storage Facility tanks (as listed in Appendix B.15) and the M-Area storage building by a vitrification process in the M-Area Vendor TE

Treatment Facility. The M-Area Vendor Treatment Facility was identified as the preferred option for TE TC two additional wastes (listed in Appendix B.15) in the *SRS Proposed Site Treatment Plan.* Additional tank capacity would not be required; the existing M-Area Process Waste Interim Treatment/Storage Facility tanks would be used for feed preparation and to transfer blowdown waste from the offgas scrubber from the vitrification process to the M-Area Liquid Effluent Treatment Facility. DOE has submitted a RCRA permit application requesting interim status for a pad in M-Area to store the vitrified wastes and the stabilized ash and blowdown wastes from the Consolidated Incineration Facility.

For the expected forecast, DOE would construct and operate a containment building for decontaminating TC approximately 34 percent of the expected mixed waste for the 30-year period (glass, metal, organic, inorganic, and heterogeneous debris; bulk equipment; and composite filters). The decontamination process would consist of such technologies for the removal of hazardous constituents as degreasing, water washing, and frozen carbon dioxide pellet blasting. Decontaminated debris and equipment would be managed as low-activity waste equipment (see Section 2.4.3). Materials that could not be TE decontaminated would be macroencapsulated in welded stainless steel boxes or in a polymer coating. Secondary wastes from the decontamination process would be collected for incineration in the Consolidated Incineration Facility. It is estimated that 80 percent of the materials would be decontaminated. Spent decontamination solutions are estimated to constitute 50 percent of the original volume of the materials to be decontaminated (Hess 1994e). DOE would also macroencapsulate lead wastes in the containment building. The lead would be placed in a polymer coating in accordance with RCRA requirements. See Appendix B.6 for a description of the containment building.

DOE would construct and operate a soil sort facility to separate contaminated soils from soils with no detectable contamination. Under alternative A, the soil sort facility would be mobile. Approximately TC 39 percent of the anticipated mixed waste consists of soils that would be processed at this facility. It is estimated that 60 percent of the incoming soils would be contaminated and require treatment prior to disposal (Hess 1994e). Contaminated soils would be incinerated in the Consolidated Incineration TE Facility, and soils with nondetectable contamination would be used as backfill. See Appendix B.28 for a description of the soil sort facility.

DOE would begin operating the Consolidated Incineration Facility in 1996 to treat approximately TC 33 percent of the mixed waste anticipated in the expected forecast, including benzene waste generated by the Defense Waste Processing Facility, organic and aqueous liquid wastes, PUREX solvent, paint waste, radioactive oil, contaminated soils, and organic and inorganic sludges. Certain mixed wastes (e.g., filter media from the M-Area Liquid Effluent Treatment Facility and solvent-contaminated rags and wipes) TC would be reduced in size or repackaged to conform to the Consolidated Incineration Facility's waste acceptance criteria (i.e., solid wastes must be packaged in 21-inch cardboard boxes) prior to incineration. The Consolidated Incineration Facility would also treat approximately 2,000 cubic meters (5.30×10^5 gallons) per year of spent decontamination solutions from the containment building. Stabilized ash and blowdown waste from the Consolidated Incineration Facility would be sent to RCRA-permitted disposal or to shallow land disposal. It is estimated that 70 percent of the stabilized ash and blowdown would be sent to RCRA-permitted disposal and 30 percent would be sent to shallow land disposal (Hess 1994e).

DOE would begin shipping small quantities of elemental mercury and mercury-contaminated waste for treatment at the Idaho National Engineering Laboratory Waste Experimental Development Facility, as identified in the *SRS Draft Site Treatment Plan*. The elemental mercury would be treated by amalgamation, and the mercury-contaminated waste would be stabilized in a grout matrix. The treated wastes would be returned to SRS for disposal. See Appendix B.21 for a description of the offsite treatment activities.

DOE would begin shipping low-level PCB wastes offsite for treatment of the PCB fraction. The radioactive residuals from treatment would be returned to SRS for shallow land disposal. TE

DOE would begin shipping lead to an offsite commercial facility for decontamination. It is estimated that 80 percent of the lead would be decontaminated (Hess 1994e). The commercial facility would return radioactive residuals from the decontamination process and the portion of the lead waste that could not be decontaminated to SRS for disposal. For purposes of assessment, the commercial facility to be used for the treatment of mixed waste lead was assumed to be located in Oak Ridge, Tennessee. In terms of transportation distance and surrounding population, this location is representative of the range of possible locations. TC

DOE would make a one-time shipment of calcium metal waste to the Los Alamos National Laboratory for treatment by the Reactive Metals Skid, a mobile wet oxidation unit. The radioactive residuals from treatment would be returned to SRS for shallow land disposal (WSRC 1995). TC

2.4.5.1.3 Disposal

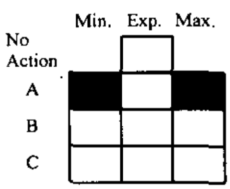
DOE submitted an application for a RCRA permit to SCDHEC for 10 Hazardous Waste/Mixed Waste Disposal Vaults. For purposes of this EIS, DOE based its proposed disposal vaults on the design of its current Hazardous Waste/Mixed Waste Disposal Vault.

TE

As described in Section 2.2.5.3 under the no-action alternative, DOE would construct and operate RCRA-permitted vaults for disposal of mixed wastes. In addition, for the alternative A – expected waste forecast, DOE would manage hazardous waste in these vaults and would also dispose of 70 percent of the stabilized ash and blowdown from the Consolidated Incineration Facility; treated elemental mercury from the Idaho National Engineering Laboratory; and macroencapsulated debris, bulk equipment, and lead from the containment building in the vaults. The first of the RCRA-permitted disposal vaults would begin accepting wastes in 2002, and DOE would construct additional vaults as needed (Hess 1995c). Refer to Section 2.4.7 for mixed waste disposal capacity projections over the 30-year period.

TC

Mixed wastes subject to RCRA because they exhibit a hazardous characteristic may be treated in a way that eliminates the characteristic (e.g., toxic metals may be immobilized). If mixed wastes are treated in this manner, they need not be disposed of in RCRA-permitted facilities and DOE would dispose of them as low-level wastes. DOE would send 30 percent of the stabilized ash and blowdown from the Consolidated Incineration Facility, stabilized mercury waste from the Idaho National Engineering Laboratory, stabilized residuals from treating radioactive PCB wastes, and calcium metal treatment residuals to shallow land disposal (Hess 1994e, 1995a). Refer to Section 2.4.7 for projections of low-level waste disposal over the 30-year period.



2.4.5.2 Mixed Waste – Minimum and Maximum Waste Forecasts

TC

For the alternative A – minimum and maximum waste forecasts, DOE would manage mixed waste somewhat differently than under the expected waste forecast (see Figure 2-19). These changes in waste management practices described for the expected waste forecast are attributed to the volume of soils anticipated in the minimum (27 percent) and maximum (54 percent) forecasts, compared to the expected (39 percent) forecast. In addition, because of the large volume of debris that would be decontaminated at the containment building for the maximum forecast, a wastewater treatment unit would be constructed to treat spent decontamination solutions (see Appendix B.6 for a discussion of the wastewater treatment unit). Limited quantities of liquid and solid residuals from the wastewater treatment unit (approximately 6 percent of the influent wastewater volume) would be burned at the Consolidated Incineration Facility. Table 2-26 describes the percentage of mixed waste distributed among the various treatment options for the minimum and maximum forecasts.

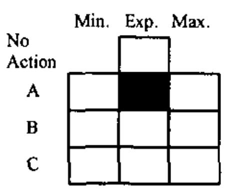
Table 2-26. Mixed waste treatment options for alternative A minimum and maximum forecasts.[a,b]

Minimum waste forecast	Maximum waste forecast
27 percent to soil sort facility	54 percent to soil sort facility
46 percent to containment building	34 percent to containment building
33 percent incinerated	36 percent incinerated

TC

a. Source: Hess (1995c).
b. Percentages are approximate.

2.4.6 TRANSURANIC AND ALPHA WASTE



2.4.6.1 Transuranic and Alpha Waste – Expected Waste Forecast

For alternative A – expected waste forecast, DOE would provide the treatment (primarily packaging) essential to allow disposal of alpha (10 to 100 nanocuries per gram) and transuranic (greater than 100 nanocuries per gram) wastes. TE

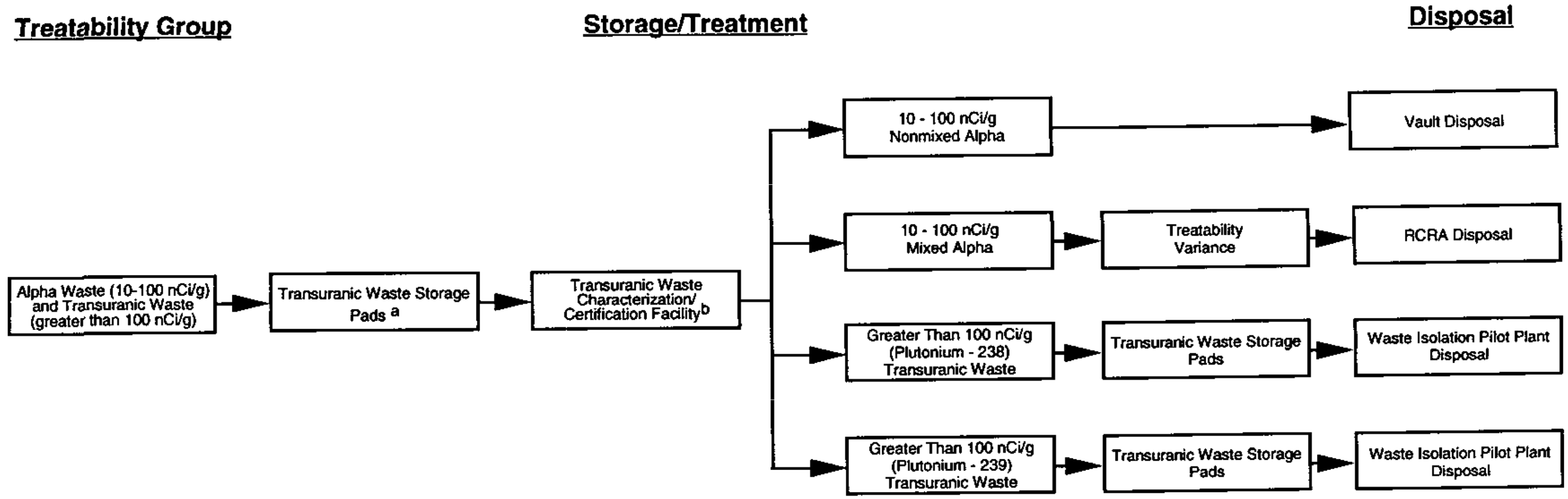
Figure 2-20 summarizes management practices for the proposed alpha and transuranic waste under alternative A, which include the waste management practices under the no-action alternative as described in Section 2.2.6 and the following:

- Construct and operate a transuranic waste characterization/certification facility to characterize, treat, repackage, and certify waste for disposal.

- Construct facilities to dispose of nonmixed and mixed alpha waste onsite in the low-activity waste vaults or RCRA-permitted disposal vaults.

- Return Rocky Flats incinerator ash currently in storage for consolidation and treatment with similar wastes at that facility. TC

- Dispose of transuranic waste at the Waste Isolation Pilot Plant (Hess 1994e, 1995a). TE



Legend:

[a] Other storage locations are being evaluated: this analysis is based on transuranic waste storage pads only

[b] Waste certification activities consolidated with characterization/certification facility

nCi/g = Nanocuries per gram

TE | Source: Hess (1994e).

TC | Note: This figure does not include short-term or transition activities.

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Figure 2-20. Transuranic waste management plan for alternative A expected waste forecast.

2.4.6.1.1 Storage

DOE would continue to accumulate alpha and transuranic waste as described in the no-action alternative (Section 2.2.6). DOE would package and store containers on transuranic waste storage pads to await processing, retrieve drums from mounded storage on Transuranic Waste Storage Pads 2 through 6, and construct new pads as needed.

To meet RCRA storage requirements for newly generated waste, DOE would construct 12 additional transuranic storage pads by 2006 (Hess 1995c). TC

For purposes of this EIS, it is assumed that the Waste Isolation Pilot Plant would operate from 1998 to 2018 and would accept SRS's transuranic waste (WSRC 1995). Transuranic waste processed by the transuranic waste characterization/certification facility (Appendix B.31) after 2018 would remain in TE storage at SRS until a new geologic repository became available. DOE would require 2 transuranic TC waste storage pads to store the transuranic waste processed and packaged between 2019 and 2024 (Hess 1995c). DOE has not yet determined how these wastes will be disposed of. TE

2.4.6.1.2 Treatment

DOE would return a small amount (0.1 cubic meter) of incinerator ash from Rocky Flats that is currently stored at SRS to Rocky Flats for consolidation and treatment with similar wastes. The *SRS Proposed Site Treatment Plan* concluded that it was not cost effective to develop treatment at SRS for this small quantity of material. Rocky Flats is currently investigating alternatives for management of the ash and at this time it is not known what the final disposition of the material will be. TE TC

From 1995 to 2006, the Experimental Transuranic Waste Assay Facility/Waste Certification Facility (Appendix B.9) would process for disposal 6 percent of the 30-year forecast waste volume. The facility would operate at an average capacity of 118 cubic meters (4,200 cubic feet) per year during this period. The facility would characterize and certify newly generated nonmixed and mixed alpha waste (4 and 2 percent of the forecast waste volume, respectively) for disposal in low-activity waste vaults and RCRA-permitted disposal vaults, respectively. The facility would handle only drummed waste and would need to be modified to encapsulate mixed alpha debris waste by welding shut the lids of drums. DOE would request a treatability variance from EPA so that the non-debris portion of the mixed alpha waste (less than 5 percent) could be treated in accordance with the land disposal restrictions standards for hazardous debris. Macroencapsulation in welded containers would be the preferred treatment for the TE TC mixed alpha waste that did not meet the RCRA definition of debris (Hess 1994e). Further details on this TE topic are found in Appendix B.9.

For the purposes of this EIS, it is assumed that the Waste Isolation Pilot Plant would receive a no-migration variance (DOE 1986). A no-migration variance means that the disposal facility has been shown to be protective of the environment because migration of hazardous constituents from the facility would not occur while the waste remains hazardous. As a result, wastes sent to the Waste Isolation Pilot Plant would not need to meet RCRA requirements for land disposal. DOE would perform very little TE treatment on the transuranic waste and would package it to meet waste acceptance criteria for the Waste Isolation Pilot Plant.

DOE would construct and operate a transuranic waste characterization/certification facility to perform TE assays and characterize the existing waste in drums, culverts, and boxes stored on transuranic waste storage pads. The facility would begin operating in 2007 and would segregate the waste into one of the TE following four categories based on its radiological and RCRA characteristics (Hess 1994e):

TE
- Nonmixed Alpha Waste (10 to 100 nanocuries per gram) consist of job-control and bulk wastes that do not meet the DOE definition of transuranic waste. DOE manages this waste as transuranic waste because the generating facilities did not have the capabilities to test them to demonstrate that they have less than 100 nanocuries of transuranic contamination per gram.

TE
- Mixed Alpha Waste (10 to 100 nanocuries per gram) consists of job-control and bulk wastes that also contain RCRA hazardous waste. Because of the presence of the hazardous constituents, this waste must meet RCRA requirements.

TE
- Plutonium-238 Waste (greater than 100 nanocuries per gram) is contaminated predominantly with the plutonium-238 radioisotope. Plutonium-238 is difficult to ship because of the heat and gas generated by its radiological decay. DOE would reevaluate its curie loading limits for shipping containers used to package plutonium-238 to determine whether this waste could be transported safely (Hess 1994i). DOE would characterize the plutonium-238 waste separately to accommodate modifications to the shipping requirements for this waste.

- Plutonium-239 Waste (greater than 100 nanocuries per gram) is contaminated predominantly with the plutonium-239 radioisotope. Decay heat and gas generation do not generally present problems for shipping this waste to the Waste Isolation Pilot Plant in the current containers. Higher-activity plutonium-239 waste may require treatment to eliminate gas generation that would impede shipment of this waste.

From 2007 to 2024, the transuranic waste characterization/certification facility would process 94 percent TC of the forecast waste volume. The job-control and bulk waste would be sorted according to its radioactive and hazardous constituents and repackaged into 55-gallon drums. This EIS assumes the following distribution among the four categories of transuranic waste: 17 percent nonmixed alpha, 3 percent mixed alpha, 64 percent plutonium-238, and 16 percent plutonium-239. It is further assumed TC that the facility would reduce the volume of the alpha waste by 30 percent through processing and TE repackaging (Hess 1994e). In the draft EIS, DOE assumed that a 30 percent volume reduction would be realized for transuranic wastes. However, due to shipping constraints (i.e., curie loading restrictions of the transuranic waste transportation vehicle) imposed on transuranic wastes containing organic materials TC that could generate gas, DOE no longer believes it would be possible to achieve more efficient packaging, and thereby increase the curie loading, of the transuranic waste drums that would be shipped to the Waste Isolation Pilot Plant. Therefore, no volume reduction was assumed for the transuranic waste processed between 2007 and 2018. A 30 percent volume reduction is assumed to result from the processing and repackaging of transuranic waste between 2019 and 2024 as this waste would not be shipped to the Waste Isolation Pilot Plant. TC

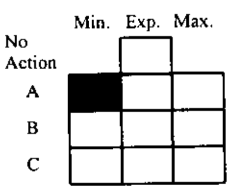
The nonmixed alpha wastes would be repackaged for disposal in the low-activity waste vaults. DOE would macroencapsulate mixed alpha waste in accordance with the treatability variance from EPA for the non-debris portion as described for the Experimental Transuranic Waste Assay Facility/Waste Certification Facility (Hess 1994h). The macroencapsulated mixed waste would be sent to TE RCRA-permitted disposal vaults. Transuranic waste would be repackaged according to the predominant radioisotope content (i.e., plutonium-238 or -239) to meet shipping requirements and the waste acceptance criteria for disposal at the Waste Isolation Pilot Plant (Hess 1994i). Further details on this topic are found in Appendix B.31. TE

2.4.6.1.3 Disposal

Under alternative A, it is estimated that volumes for disposal would be reduced 7 percent through TC operation of the transuranic waste characterization/certification facility. During the period between 1995 and 2006, nonmixed and mixed alpha wastes would be disposed of in the low-activity waste vaults or sent to RCRA-permitted disposal (4 and 2 percent of the processed volume, respectively) through certification by the waste generators that would be verified through operation of the Experimental TC Transuranic Waste Assay Facility/Waste Certification Facility (Hess 1995c). TE

TC TE During the period between 2007 and 2024, nonmixed alpha waste (12 percent of the processed volume) would be disposed of in the low-activity waste vaults, treated mixed alpha waste (2 percent of the processed volume) would be sent to RCRA-permitted disposal, and transuranic waste (77 percent of the processed volume) would be sent to the Waste Isolation Pilot Plant (until 2018) (Hess 1995c). Transuranic waste not sent to the Waste Isolation Pilot Plant by 2018 (3 percent of the processed volume) would remain in storage on 2 transuranic waste storage pad until a new geologic repository became available. DOE has not evaluated how it will dispose of this waste.

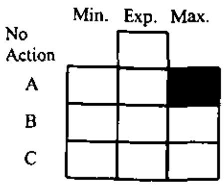
TC DOE would ship 1,345 cubic meters (47,500 cubic feet) per year of transuranic waste to the Waste Isolation Pilot Plant between 2008 and 2018. The Waste Isolation Pilot Plant Land Withdrawal Act (P.L. 102-579, October 30, 1992) authorizes a total of 1.76×10^5 cubic meters (6.2×10^6 cubic feet) of waste in this repository. TC TE By 2018, DOE would have shipped a volume of waste equal to 9 percent of the total capacity of the Waste Isolation Pilot Plant (Hess 1995c).



2.4.6.2 Transuranic and Alpha Waste – Minimum Waste Forecast

TC Despite smaller volumes anticipated in the minimum waste forecast, DOE would continue management practices for transuranic and alpha wastes, as shown in Figure 2-20. To accommodate the transuranic waste storage pads and newly generated waste, DOE would need three additional pads by 2006 for alternative A – minimum waste forecast. By 2024, DOE would need only one pad to store the remaining processed and packaged transuranic waste.

TC TE The Experimental Transuranic Waste Assay Facility/Waste Certification Facility would process newly generated alpha waste until the transuranic waste characterization/certification facility began operating in 2007 (Hess 1994e). Following characterization and repackaging, the nonmixed alpha waste (15 percent of the processed volume) would remain at SRS for disposal in low-activity waste vaults. TC Mixed alpha waste (5 percent of the processed volume) would be macroencapsulated and sent to RCRA-permitted disposal. The transuranic waste (79 percent of the processed volume) would go to the Waste Isolation Pilot Plant. One percent of the processed transuranic waste volume would remain in storage on one transuranic waste storage pad. DOE would ship 975 cubic meters (34,400 cubic feet) per year of transuranic waste to the Waste Isolation Pilot Plant during the period between 2008 and 2018. TC TE By 2018, DOE would have shipped for disposal a quantity of transuranic waste equal to 7 percent of the total capacity of the Waste Isolation Pilot Plant (Hess 1995c).



2.4.6.3 Transuranic and Alpha Waste – Maximum Waste Forecast

For alternative A – maximum waste forecast, DOE would change transuranic and alpha waste management practices because of the substantially larger volumes of transuranic waste (25 times the expected waste forecast). In addition, there would be a larger volume of mixed alpha waste (45 percent of the total volume compared to 16 percent for the expected waste forecast) for processing and disposal. The larger volumes would result from extensive environmental restoration such as exhuming previously disposed waste. Environmental restoration during the period 2000 through 2005 would account for 93 percent of the forecast waste volume.

DOE would require 1,168 additional transuranic waste storage pads by 2006 for the alternative A – maximum waste forecast to store the anticipated waste volumes. By 2024, DOE would need only two transuranic waste storage pads to store the remaining processed and packaged transuranic waste (i.e., that which had not been disposed of) (Hess 1995c). TC TC TE

DOE would manage mixed alpha waste somewhat differently under the maximum waste forecast than under the expected waste forecast. In the expected forecast, most of the mixed alpha waste would be macroencapsulated by the waste generators or in the Experimental Transuranic Waste Assay Facility/Waste Certification Facility; however, in the maximum case, most macroencapsulation would be conducted in the transuranic waste characterization/certification facility. DOE would need macroencapsulation capacity 375 times that required for the expected forecast to manage mixed alpha waste.. DOE would need approximately 160 times the disposal capacity as well. TC

From 1995 through 2006, nonmixed and mixed alpha waste would be placed in low-activity waste vaults or sent to RCRA-permitted disposal, respectively (each less than 0.25 percent of the processed volume), through the operation of the Experimental Transuranic Waste Assay Facility/Waste Certification Facility (Hess 1995c). TC TE

For the maximum waste forecast, the operation of the transuranic waste characterization/ certification facility would reduce the waste volume for disposal by 17 percent. The facility would process most of the waste (99 percent of the forecast waste volume) for disposal. The waste characterization assumed the following distribution among the four categories: 17 percent nonmixed TC

TC alpha, 41 percent mixed alpha, 34 percent plutonium-238, and 8 percent plutonium-239 waste (Hess 1995a, c).

During the period between 2007 and 2024, nonmixed alpha waste (14 percent of the processed volume) would be disposed of in low-activity waste vaults. Treated mixed alpha waste (35 percent of the TC processed volume) would be sent to RCRA-permitted disposal, and most of the transuranic waste (50 percent of the processed volume) would be available for shipment to the Waste Isolation Pilot Plant. Less than one-half percent of the processed volume of transuranic waste would remain in storage on TC TE two transuranic waste storage pads (Hess 1995c).

For the maximum forecast, DOE would have available for shipment to the Waste Isolation Pilot Plant approximately 19,197 cubic meters (6.78×10^5 cubic feet) per year of transuranic waste between the years 2008 and 2018 as a result of the transuranic waste characterization/certification facility's operations. This transuranic waste volume is more than 30 percent greater than the total capacity (1.76×10^5 cubic TC meters or 6.2×10^6 cubic feet) authorized for the repository under the Waste Isolation Pilot Plant Land TE Withdrawal Act. The only alternative to transfer of this material to the Waste Isolation Pilot Plant would be storing it at SRS beyond the 30-year period analyzed by this EIS. The volume of transuranic waste in excess of the maximum capacity authorized for the repository would be the equivalent of approximately 120 storage pads. Therefore, the limited treatment configuration proposed under alternative A is incompatible with the transuranic waste volumes anticipated in the maximum waste forecast.

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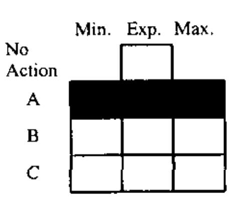


2.4.7 SUMMARY OF ALTERNATIVE A FOR ALL WASTE TYPES

Under alternative A, DOE would continue the activities to manage waste at SRS listed for the no-action alternative (Section 2.2.7), including construction of additional storage capacity for mixed waste and transuranic and alpha wastes, but less than is required under the no-action alternative. In addition, DOE would:

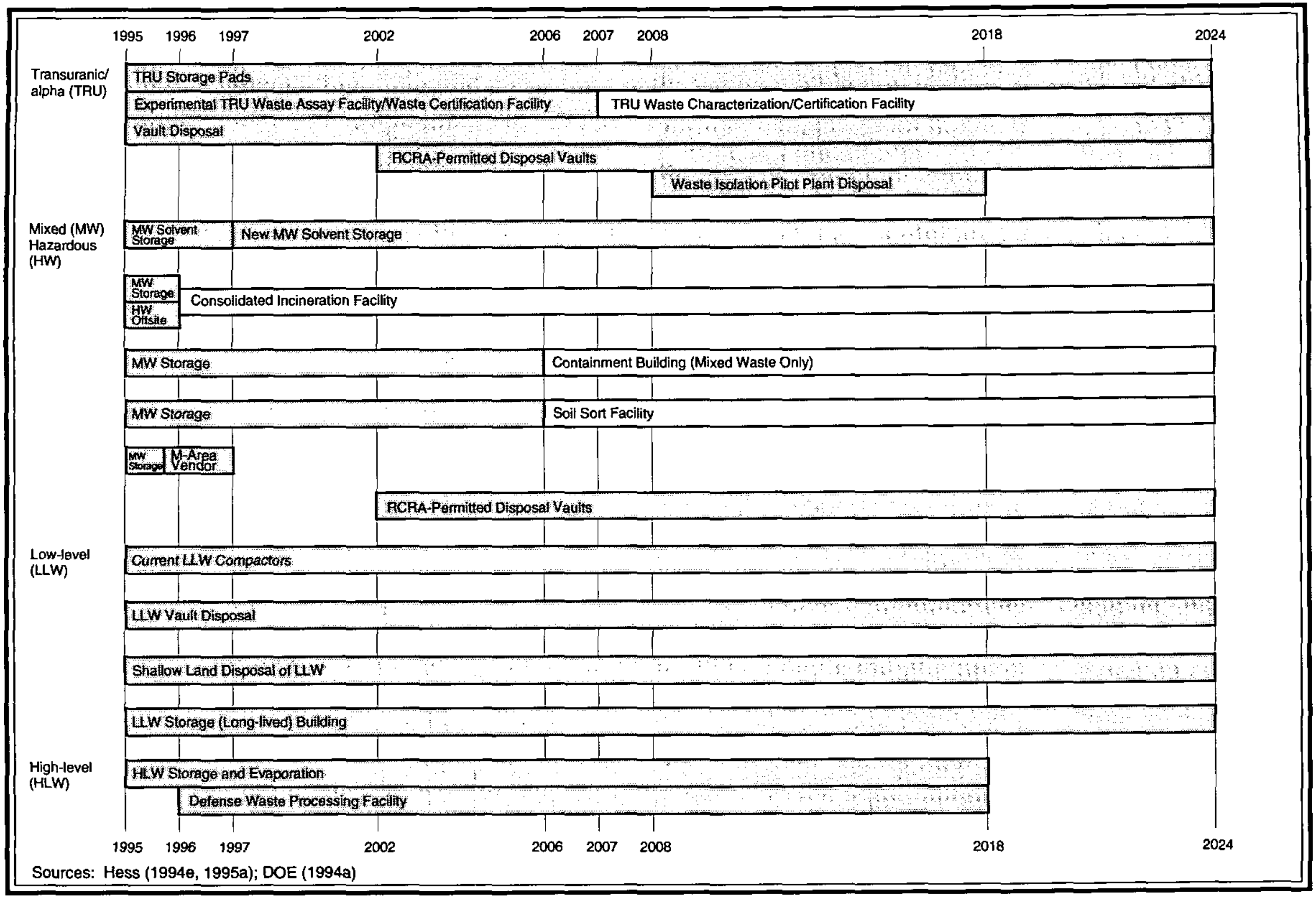
- Construct and operate a containment building to process mixed wastes.
- TC Operate a mobile soil sort facility.
- Treat small quantities of mixed and PCB wastes offsite.
- Burn mixed and hazardous wastes in the Consolidated Incineration Facility.

- Construct and operate a transuranic waste characterization/certification facility.
- Store transuranic waste until it can be sent to the Waste Isolation Pilot Plant.

Figure 2-21 presents a timeline for the ongoing and proposed waste management activities for alternative A. DOE would operate the existing and planned waste management facilities until the proposed facilities could be designed, constructed, and begin operating. For all the waste types except high-level waste, the ongoing and planned activities that would occur from 1995 to approximately 2007 are shown in Figure 2-22. The proposed waste management activities after 2007 are shown in Figure 2-23. Table 2-27 presents the additional storage, treatment, and disposal facilities under alternative A and a comparison to those required under the no-action alternative. TC

The largest impacts to land outside of E-Area would occur under the maximum waste forecast. Approximately 802 acres would be required for waste storage facilities until treatment begins in approximately 2006. However, by 2024, most of the waste would have been treated and disposed of and the land needed outside of E-Area would be only 248 acres. It is highly unlikely that the technology used to store the waste volumes under the minimum and expected forecasts would be suitable for the maximum forecast. However, to compare the different treatment configurations among the alternatives of this EIS, the comparison was made assuming the same technology would be applied for all three waste forecasts. For example, DOE would likely construct the 12 additional transuranic waste storage pads required for the expected case; however, DOE would probably elect not to use the same technology to build 1,168 pads required for the maximum forecast. TC

The large volumes anticipated in the maximum forecast would become reality only if all of the assumptions in the maximum forecast prove true. The waste volumes in the maximum forecast are dominated by large amounts of transuranic and mixed wastes from the exhumation of waste previously disposed of in the Burial Ground Complex and Mixed Waste Management Facility. If future remediation decisions regarding those units were to determine that waste removal of the magnitude assumed for the maximum forecast were in fact required, additional NEPA evaluation might be required to identify the appropriate technologies for this amount of waste. It is doubtful that the hundreds of acres estimated in this EIS would be used. DOE would examine alternatives such as using surplus facilities across SRS to store waste while the treatment facilities were being built. TE



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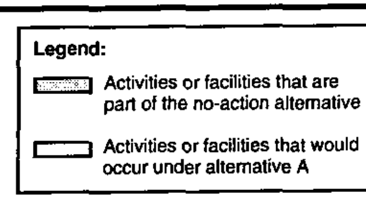

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Figure 2-21. Timeline for waste management facilities in alternative A.

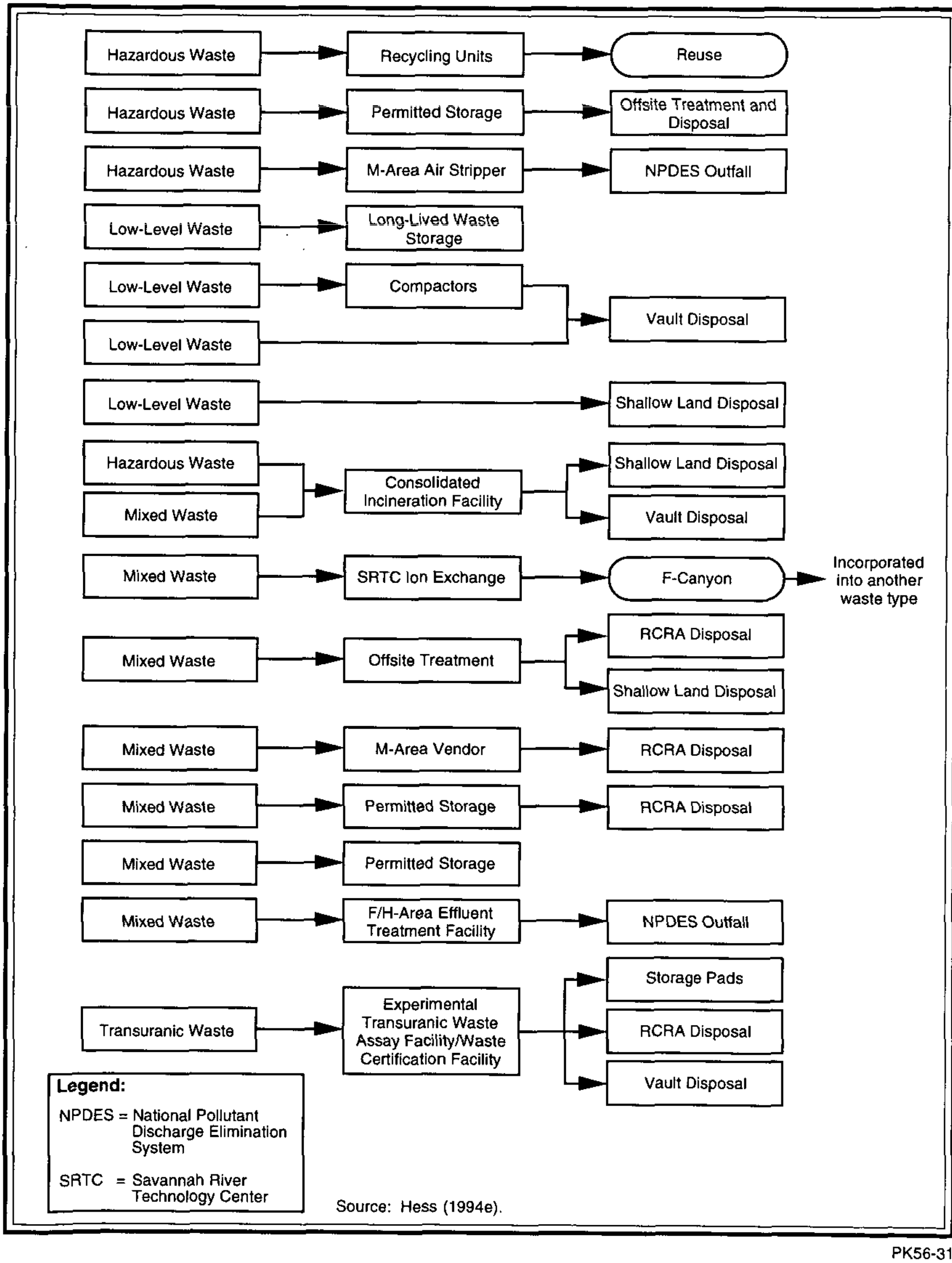

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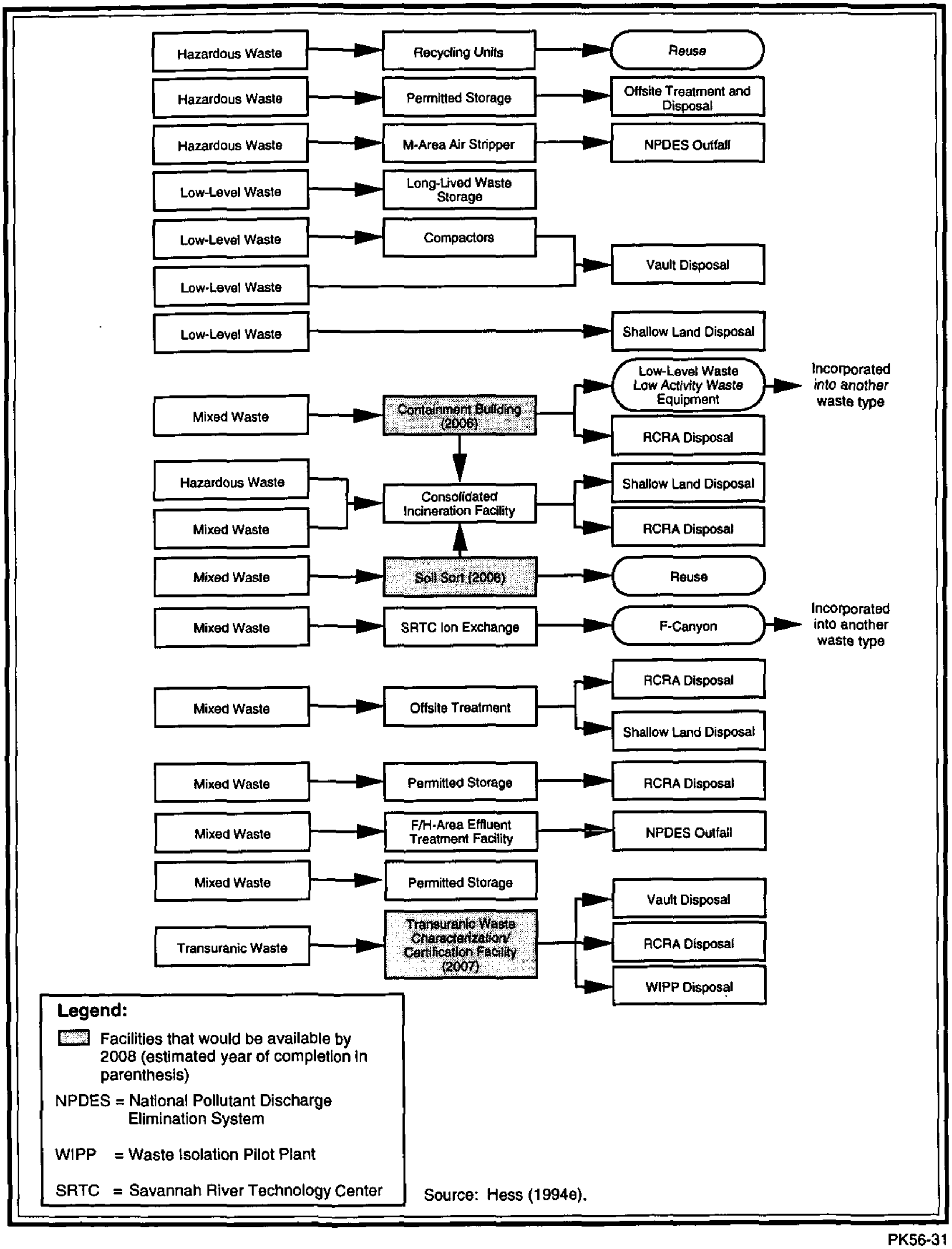
Figure 2-22. Summary of waste management activites in alternative A until approximately the year 2007.



TE | **Figure 2-23.** *Summary of waste management activities in alternative A after the year 2007.*

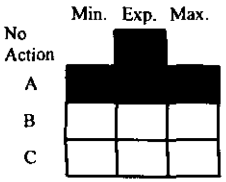
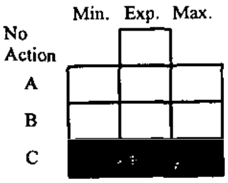


Table 2-27. Comparison of treatment, storage, and disposal facilities under alternative A and the no-action alternative. TC

	Minimum	Expected	Maximum
No action		**STORAGE:** Buildings 24 long-lived low-level waste 291 mixed waste Pads 19 transuranic and alpha waste Tanks 4 organic waste in S-Area 26 organic waste in E-Area 43 aqueous waste in E-Area **TREATMENT:** Continue ongoing and planned waste treatment activities **DISPOSAL:** 29 shallow land disposal trenches 10 low-activity waste vaults 5 intermediate-level waste vaults 1 RCRA disposal facility	
A	**STORAGE:** Buildings 7 long-lived low-level waste 45 mixed waste Pads 3 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast **DISPOSAL:** 25 shallow land disposal trenches 9 low-activity waste vaults 2 intermediate-level waste vaults 21 RCRA disposal facilities	**STORAGE:** Buildings 24 long-lived low-level waste 79 mixed waste Pads 12 transuranic and alpha waste **TREATMENT:** Continue ongoing and planned waste treatment activities; treat limited quantities of mixed and PCB waste offsite; operate the Consolidated Incineration Facility for hazardous and mixed wastes; modify the facility to accept mixed waste soils and sludges; construct and operate a mixed waste containment building, mixed waste soil sort unit, and transuranic waste characterization/certification facility **DISPOSAL:** 73 shallow land disposal trenches 12 low-activity waste vaults 5 intermediate-level waste vaults 61 RCRA disposal facilities	**STORAGE:** Buildings 34 long-lived low-level waste 757 mixed waste Pads 1,168 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast, except containment building modified to include wastewater treatment capability to treat spent decontamination solutions; treat its secondary waste at the Consolidated Incineration Facility **DISPOSAL:** 644 shallow land disposal trenches 31 low-activity waste vaults 31 intermediate-level waste vaults 347 RCRA disposal facilities

TC

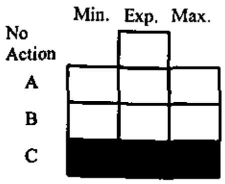
TE



2.5 Alternative C – Extensive Treatment Configuration

As described in the beginning of Chapter 2, DOE bases alternative C on proven treatment technologies that would minimize the volume and toxicity of waste and would create a highly migration-resistant final waste form. This alternative would comply with applicable regulatory requirements and would implement technologies and practices that emphasize treatment for stabilization or destruction of hazardous constituents to ensure protection of the environment.

Alternative C is identical to the no-action alternative with respect to the management of liquid high-level waste. This section discusses only the changes, if any, necessary in alternative C to accommodate the minimum and maximum forecasts of high-level wastes. Alternative C includes several treatment facilities for low-level, mixed, and transuranic wastes, including an offsite smelter, the Consolidated Incineration Facility, and the non-alpha vitrification facility for low-level waste; the Consolidated Incineration Facility, containment building, and non-alpha vitrification facility for mixed waste; and the transuranic waste characterization/certification facility, Consolidated Incineration Facility, and alpha vitrification facility for transuranic and alpha wastes. Hazardous waste would also be treated onsite at the Consolidated Incineration Facility, containment building, and non-alpha vitrification facility. By implementing these treatments, DOE would appreciably decrease the amount of additional storage capacity for mixed and transuranic wastes from that required under the no-action alternative. Mixed waste storage would peak in 2005 and transuranic and alpha waste storage in 2006; the number of storage facilities would then decrease as new treatment facilities begin operations. Small quantities of mixed and PCB wastes would be sent offsite for treatment, and transuranic wastes would be sent to the Waste Isolation Pilot Plant for disposal when that facility becomes available. The waste volumes sent to shallow land disposal and to RCRA disposal facilities would increase from those projected for the no-action alternative due to the increased volume of treatment residuals. Sections 2.5.3, 2.5.4, 2.5.5, and 2.5.6 discuss the proposed management activities for low-level, hazardous, mixed, and transuranic and alpha wastes under alternative C. Section 2.5.7 summarizes the activities and facilities under alternative C and compares them to those required under the no-action alternative.



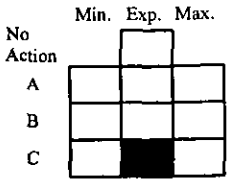
2.5.1 POLLUTION PREVENTION/WASTE MINIMIZATION

The waste minimization activities described for the no-action alternative (Section 2.2.1) would continue under alternative C. Only the waste throughput and recycled product output volumes would change. In addition to ongoing activities, DOE would initiate other waste minimization activities addressing low-level, hazardous, and mixed wastes. Table 2-28 summarizes the waste minimization activities that would occur under alternative C in addition to the ongoing (no-action) activities.

Table 2-28. Waste minimization activities for alternative C.[a]

Minimization activity	Treatability group	Waste forecast	Estimated reduction (cubic meters)[b]	
Source reduction	Low-level job-control waste	Expected	850	TE
		Minimum	850	
		Maximum	850	
Recycle into waste containers (beneficial reuse)	Low-activity metal waste	Expected	10,501	
		Minimum	5,894	TC
		Maximum	27,556	
Decontaminate for salvage	Hazardous metal waste	Expected	10,994	
		Minimum	3,182	
		Maximum	19,460	
Reuse decontaminated lead	Mixed waste lead	Expected	2,408	
		Minimum	1,053	TC
		Maximum	6,140	
Sort soil to divert for beneficial reuse	Mixed waste soils and concrete	Expected	35,332	TC
		Minimum	9,549	
		Maximum	176,039	
Sort soil to divert for beneficial reuse	Low-activity and suspect soil and small concrete pieces	Expected	19,333	
		Minimum	5,733	
		Maximum	301,469	

a. Sources: Hess (1994e, 1995c). TE
b. To convert to cubic feet, multiply by 35.31.



2.5.1.1 Pollution Prevention/Waste Minimization – Expected Waste Forecast

Source reduction efforts would be initiated to prevent the generation of an estimated 850 cubic meters (30,000 cubic feet) of low-level job-control waste. One such effort would eliminate the use of cardboard boxes for packaging certain low-level wastes for disposal. Another would be to minimize the number of mop heads going into the low-level job-control waste stream by replacing the current mop heads with a more efficient, longer-service-life mop head or a launderable mop head (Stone 1994d).

DOE would build on the beneficial reuse integrated demonstration program (Section 2.2.1.4.2) and help private industry establish a facility to recycle radioactively contaminated steel (Boettinger 1994a). The beneficial reuse program would recycle stainless steel and carbon steel from low-activity equipment TC waste. An estimated 10,501 cubic meters (3.71×10^5 cubic feet) of low-activity equipment waste would TE be recycled under this program (Hess 1995c). The low-activity equipment waste would include metal debris and bulk equipment that was originally mixed waste but had been cleared of hazardous constituents in the containment building. (One of the facilities proposed for alternative C is a mixed waste containment building where some hazardous wastes would also be treated. See Sections 2.5.4 and 2.5.5 and Appendix B.6 for more details.) Like the demonstration, the full-scale program would use an offsite smelter to decontaminate the steel; the steel would be fabricated into waste disposal containers for TE return to and reuse by DOE. The offsite recycling process is described in Appendix B.19.

The containment building would also treat the following hazardous wastes: metal debris, bulk equipment, and waste equipment classified as hazardous due to lead content. The metal debris and bulk equipment would be decontaminated of hazardous constituents. The lead-bearing waste would be separated into pieces by metal type. The various scrap metals resulting from the decontamination and separation processes would then be reused by SRS as is, sent (if scrap lead) to the onsite lead melter for fabrication to a useful form (Section 2.2.1.4.2), or be sold as scrap metal to offsite recyclers. An estimated 13,743 cubic meters (4.85×10^5 cubic feet) of hazardous waste metal debris, bulk equipment, and lead-bearing material would be decontaminated or sorted, yielding an estimated 10,994 cubic meters TE (3.88×10^5 cubic feet) (80 percent) of scrap metal for recycling (Hess 1995c).

TC Lead with surface radioactive contamination would be recycled. It is estimated that 3,010 cubic meters (1.10×10^5 cubic feet) of radioactively contaminated lead would be decontaminated, and an estimated TC TE 80 percent [2,408 cubic meters (85,000 cubic feet)] would be available for reuse (Hess 1995c).

Mixed-waste lead that could not be decontaminated would be treated and disposed of onsite rather than recycled (DOE 1994d). See Section 2.4.1.1 for more information.

DOE would sort soil and associated rubble, including small pieces of concrete to reduce the amount of soils and concrete that would be disposed of. After separation, the contaminated soils would be disposed of rather than washed. Although considered as a treatment option, soil washing was not chosen for several reasons, including the fact that the contaminants would be transferred to the wash water. The secondary waste, contaminated wash water, could not be as easily treated and disposed of as other secondary wastes. Also, soil washing would be more expensive than other technologies, but would not result in a proportional decrease in the environmental risk posed by the residual waste and soil (Hess 1994j).

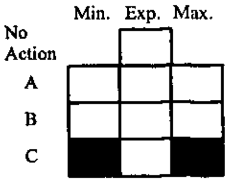
DOE would minimize the volume of low-activity soils, suspect soils, small pieces of concrete, and mixed waste soils and concrete that would require disposal by sorting them in the non-alpha vitrification facility. The sorting process (described in Appendix B.18) would divert the materials with nondetectable levels of contamination to beneficial uses at SRS. The throughput is estimated to be 1.26×10^5 cubic meters (4.43×10^6 cubic feet) [37,179 cubic meters (1.3×10^6 cubic feet) of low-level waste and 88,331 cubic meters (3.12×10^6 cubic feet) of mixed waste]. It is estimated that a total of 54,665 cubic meters (1.93×10^6 cubic feet) [19,333 cubic meters (6.83×10^5 cubic feet) from the low-level wastes and 35,332 cubic meters (1.25×10^6 cubic feet) from the mixed wastes] would be diverted for beneficial uses (Hess 1995c). Beneficial uses include backfill for shallow land disposal.

TE
TE
TC
TC
TE

DOE would not recycle large pieces of contaminated concrete as aggregate in construction or road-building projects because SRS would not have a need for the volume of aggregate that would be generated. The limited construction projects would have a large volume of uncontaminated concrete to draw from for "concrete to aggregate" recycling programs that DOE could initiate. Furthermore, recycling concrete would not pose a lower risk to the environment than disposing of the concrete, and recycling would be costly (Beaumier 1994).

DOE would also use waste minimization techniques to reduce the amount of waste generated by the waste management facilities. Liquids generated by the offgas systems in the non-alpha and alpha vitrification facilities would be recycled back into their processes in closed-loop systems. The features of these facilities are further described in Appendixes B.1 and B.18. These liquid wastes would be treated and disposed of as mixed waste if they were not recycled into the process.

TE



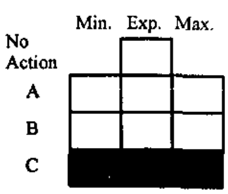
2.5.1.2 Pollution Prevention/Waste Minimization – Minimum and Maximum Waste Forecasts

For the minimum and maximum waste forecasts, DOE would continue to support the beneficial reuse program. The estimated volumes of low-activity equipment waste available for recycling under each waste forecast are indicated in Table 2-28.

DOE would implement decontamination and sorting processes for hazardous metal wastes (metal debris, bulk equipment, and waste equipment that are classified as hazardous due to lead content) to allow the recycling of scrap metal. These processes would yield scrap metal that would be offered for resale or reused onsite, as indicated in Table 2-28.

DOE would also recycle lead with surface radioactive contamination. The estimated volumes of radioactively contaminated lead that would be available for recycling under each waste forecast are indicated in Table 2-28.

TE | DOE would minimize the volume of low-activity soils, suspect soils and concrete, and mixed waste soils and concrete that would require disposal. The estimated volumes that would be available for beneficial reuse from the low-level and mixed waste soils are indicated in Table 2-28.



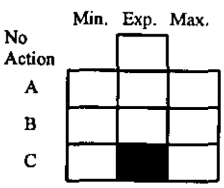
2.5.2 HIGH-LEVEL WASTE – EXPECTED, MINIMUM, AND MAXIMUM WASTE FORECASTS

Under alternative C, DOE would treat liquid high-level radioactive waste as it would be treated under the no-action alternative (see Section 2.2.2, Figure 2-9). For each waste forecast, DOE would continue current management activities, from receipt and storage of liquid high-level waste in tanks to preparation, processing, and treatment into forms suitable for final disposal. The high-level waste volumes that would be generated over the next 30 years in addition to the existing inventory of high-level waste in storage [approximately 1.31×10^5 cubic meters (3.45×10^7 gallons)] are given in Table 2-23.

These volumes are not additive because newly generated waste would be reduced approximately 75 percent via evaporation. These volumes would not require construction of new high-level waste tanks or facilities. Instead, DOE proposes to continue current management practices and to manage waste with the objective of emptying the tanks and immobilizing SRS's inventory of liquid high-level waste by 2018 (DOE 1994a).

DOE would not change the proposed high-level waste management practices as a result of the smaller volumes anticipated in the minimum forecast (45 percent less than the expected forecast). The only difference in management practices as a result of the larger volumes anticipated in the maximum forecast (23 percent more than the expected forecast) would be to operate the existing evaporators at higher rates to maintain adequate reserve tank capacity. TE

2.5.3 LOW-LEVEL WASTE



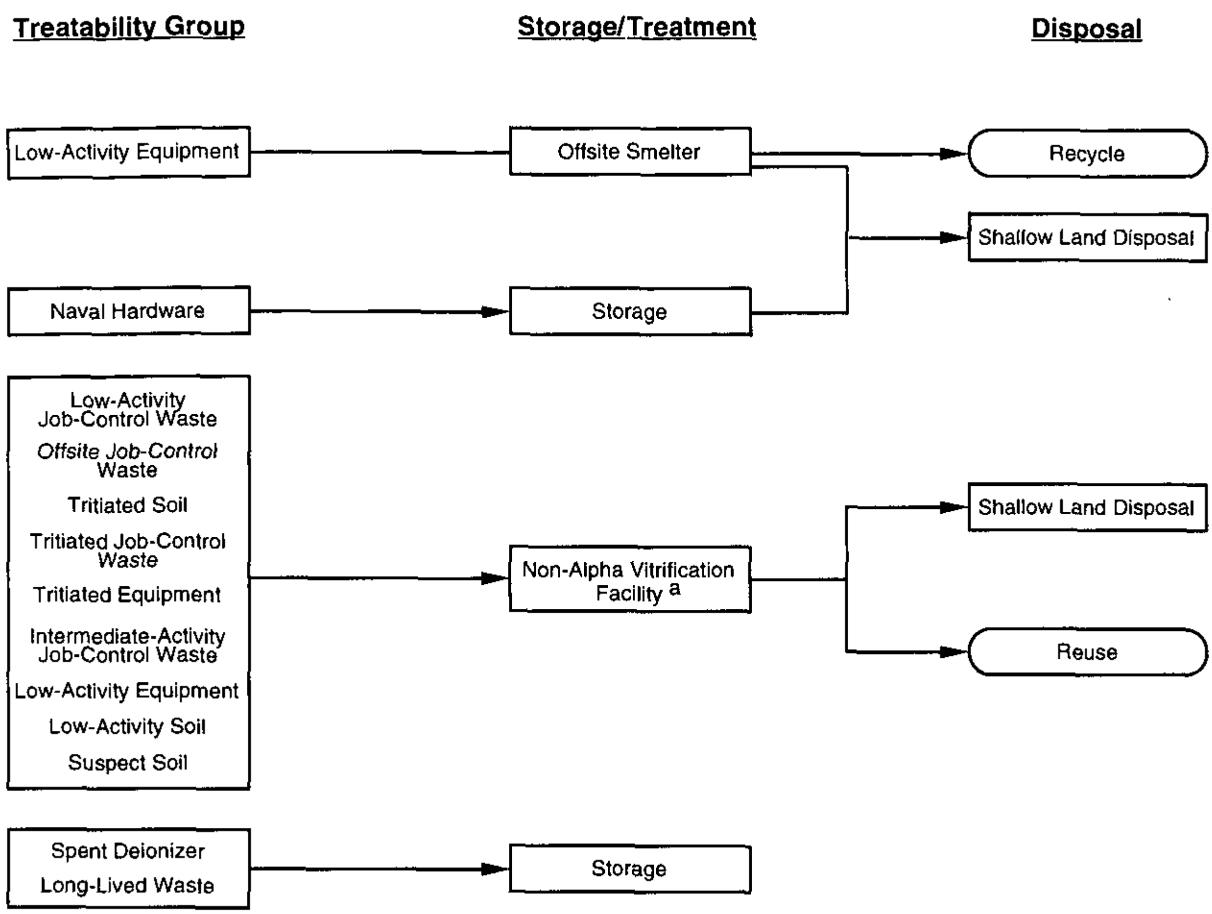
2.5.3.1 Low-Level Waste – Expected Waste Forecast

For alternative C – expected forecast, DOE would process low-level waste as in the no-action alternative presented in Section 2.2.3. Under alternative C, DOE also would implement extensive low-level waste treatment activities. Figure 2-24 summarizes the proposed management practices under alternative C, which are listed below. TE

- Decontaminate and recycle low-activity equipment waste (metals) offsite. Treatment residues would be returned to SRS for shallow land disposal.

- Complete construction of and operate the Consolidated Incineration Facility to incinerate low-activity and tritiated waste from 1996 through 2005.

- Construct and operate a non-alpha waste vitrification facility to replace the Consolidated Incineration Facility in 2006. The facility would include a soil sort capability to separate soil with contamination below detection limits from contaminated soil (contaminated soil would be treated in the vitrification process and clean soil would be used onsite as backfill material).



[a] Includes soil sort capability.

Source: Hess (1994e).

TE | Note: This figure does not include short-term or transition activities.

PK56-17

Figure 2-24. Low-level waste management plan for alternative C expected waste forecast.

For the expected waste forecast, DOE would store process water deionizers (less than 1 percent of the forecast low-level waste) in long-lived waste storage buildings, as discussed in Section 2.2.3.3. The existing buildings would reach capacity by 2000, and 24 additional buildings would be needed over the 30-year period (Hess 1995c).

DOE would use various treatments to reduce and stabilize the low-level waste. DOE would begin operating the Consolidated Incineration Facility in 1996 to incinerate combustible low-activity and tritiated job-control waste until the non-alpha vitrification facility began operating in 2006. DOE would incinerate approximately 15 percent of the forecast low-level waste. DOE would send stabilized incinerator ash and blowdown wastes to shallow land disposal (Hess 1994e, 1995c). Refer to Appendix B.5 for a description of the Consolidated Incineration Facility.

DOE would construct and operate a non-alpha vitrification facility to vitrify low-activity and intermediate-activity wastes. Because vitrification provides a more stable long-term waste form, vitrification would replace incineration when the non-alpha vitrification facility began operating in 2006. DOE would vitrify low-activity and intermediate-activity job-control wastes from both onsite and offsite; low-activity equipment; tritiated soil; tritiated job-control and tritiated equipment wastes; and low-activity and suspect soils. These wastes constitute 54 percent of the forecast low-level waste and would be treated at the non-alpha vitrification facility (Hess 1994j, 1995c).

The non-alpha vitrification facility would provide a sorting capability to separate contaminated and uncontaminated soils. It is assumed that 60 percent of the incoming low-activity soil and 40 percent of the incoming suspect soil would be contaminated and would be vitrified. Uncontaminated soil (4 percent of the low-level waste) would be used onsite as backfill. Vitrified wastes would be sent to shallow land disposal (Hess 1994e, 1995c). Refer to Appendix B.18 for a description of the non-alpha vitrification facility.

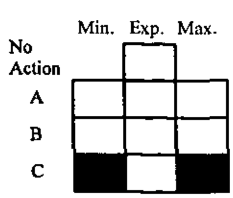
For alternative C – expected waste forecast, DOE would ship low-activity equipment waste (metals) to a commercial facility for decontamination by smelting. This material would account for only 2 percent of the forecast low-level waste. DOE anticipates that the offsite smelter would decontaminate 90 percent of the low-activity equipment waste for recycle and return 10 percent of the original waste volume to SRS for shallow land disposal (Hess 1994k). Refer to Appendix B.19 for a description of the smelter. For purposes of assessment, the facility was assumed to be located in Oak Ridge, Tennessee. In terms of transportation and surrounding population, this location is representative of the range of possible locations.

DOE would compact low-activity waste (approximately 4 percent of the total 30-year forecast low-level waste generation) in existing compactors from 1995 through 2005, as discussed in Section 2.2.3.1. DOE would operate compactors at maximum capacity in 1995 but reduce capacity in 1996, when the Consolidated Incineration Facility would begin operating. It is assumed that only 10 percent of the low-activity job-control waste generated each year from 1996 to 2005 would be compacted prior to
TE | disposal (Hess 1994e, 1995c).

TC | A 70-percent reduction in disposal volume would be realized from the proposed treatment activities for alternative C – expected waste forecast. Suspect soils, naval hardware, stabilized ash and blowdown waste from the Consolidated Incineration Facility, smelter residuals, and vitrified wastes would be sent
TC | to shallow land disposal (33 percent of the disposed waste volume). All other low-level wastes would be disposed of in low-activity or intermediate-level waste vaults.

For this forecast, DOE would send naval hardware to shallow land disposal, as described in Section 2.2.3.4. DOE would also send stabilized ash and blowdown wastes from the Consolidated Incineration Facility and stabilized residuals from the offsite smelter to shallow land disposal. DOE would also send suspect soils to shallow land disposal from 1995 to 2005 until the non-alpha vitrification facility is available. After 2006, DOE would send the vitrified wastes from the non-alpha vitrification
TE | facility to shallow land disposal (Hess 1994e).

DOE would continue to dispose of suspect soils in the engineered low-level trench, as described in
TC | Sections 2.2.3.1. DOE would dispose of low-activity waste and intermediate-activity waste in the existing low-level waste vaults, as described in Sections 2.2.3.1 and 2.2.3.2. The existing low-activity and intermediate-activity waste vaults would reach capacity by 1998 and 1999, respectively. Additional vaults would be constructed as required. DOE would not dispose of low-level wastes in vaults after 2006. At that time, low-level wastes would go to shallow land disposal after treatment at either the non-
TE | alpha vitrification facility or the offsite smelter (Hess 1995c).



2.5.3.2 Low-Level Waste – Minimum and Maximum Waste Forecasts

For alternative C – minimum and maximum forecasts, DOE would change the way it manages some low-level waste (see Figure 2-24). The changes from waste management practices described under the
TE | expected forecast are primarily the result of the larger volume of soils in the maximum waste forecast.

Soils would comprise approximately 48 percent of the anticipated waste in that forecast (compared to 9 percent for the expected forecast). A 70-percent reduction in disposal volume would be realized from the proposed treatment activities in the expected forecast, a 71-percent reduction in the minimum forecast, and a 61-percent reduction in the maximum forecast. Table 2-29 describes the percentage of low-level waste distributed among the various treatment and disposal options under the minimum and maximum forecasts. TE TC TE

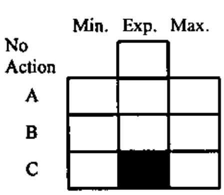
Table 2-29. *Low-level waste treatment and disposal options for alternative C minimum and maximum waste forecasts.*[a,b]

Minimum waste forecast	Maximum waste forecast
Treatment options	Treatment options
4 percent to compactors	1 percent to compactors
15 percent incinerated	5 percent incinerated
55 percent vitrified	50 percent vitrified
2 percent to offsite smelter	2 percent to offsite smelter
Disposal options	Disposal options
71 percent to vaults	32 percent to vaults
29 percent to shallow land disposal	68 percent to shallow land disposal

TC TC

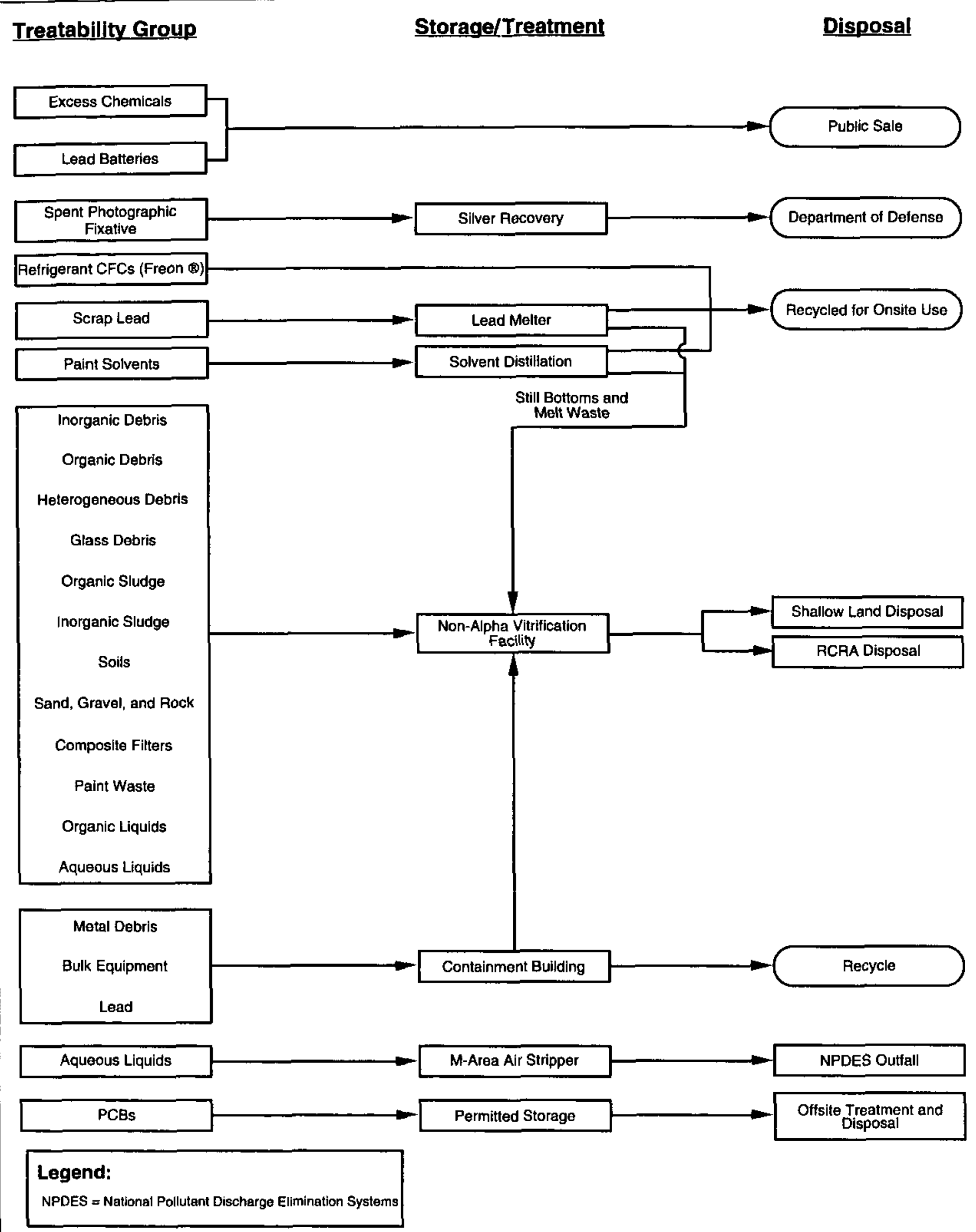
a. Source: Hess (1995c). TE
b. Percentages are approximate.

2.5.4 HAZARDOUS WASTE



2.5.4.1 Hazardous Waste – Expected Waste Forecast

Alternative C represents a more extensive application of treatment and stabilization than alternative A. As discussed in Section 2.4.4.1, DOE does not plan to construct facilities solely for the treatment of hazardous wastes. However, facilities that DOE plans to use for mixed waste could be used for hazardous wastes to the extent excess capacity is available. Figure 2-25 summarizes the proposed hazardous waste management activities for this alternative.



TE | Source: Hess (1994e, 1995a).
Note: This figure does not include short-term or transition activities.

PK56-15

Figure 2-25. Hazardous waste management plan for alternative C expected waste forecast.

In addition to the management practices for hazardous waste under the no-action alternative (Section 2.2.4), for alternative C – expected waste forecast, DOE would treat hazardous wastes onsite as follows: TE

- Construct and operate a containment building for decontamination of debris/metals for use onsite or to be sold as scrap.
- Treat a small quantity of reactive metals by wet chemical oxidation in the containment building.
- Complete construction of and operate the Consolidated Incineration Facility from 1996 to 2005 to treat selected hazardous wastes before the non-alpha vitrification facility is available. TE
- Construct and operate a non-alpha vitrification facility.
- Construct RCRA-permitted disposal vaults or use shallow land disposal to dispose of stabilized ash and blowdown waste from the incineration process and vitrified waste from the non-alpha vitrification facility.

For alternative C – expected forecast, DOE would continue to accumulate hazardous wastes for recycling onsite and offsite. DOE would also continue to store hazardous waste in the three RCRA-permitted hazardous waste storage buildings, the M-Area storage building, and on the three interim status solid waste storage pads. Most hazardous waste (approximately 46 percent of the forecast hazardous waste) would be sent offsite for treatment and disposal from 1995 to 2005. The only hazardous waste that would be sent offsite for treatment and disposal after 2005 would be PCB wastes, for which onsite treatment capability would not be available.

DOE would treat several hazardous wastes (composite filters, paint wastes, organic liquids, aqueous liquids) at the Consolidated Incineration Facility, assuming it begins operating in 1996. The stabilized ash and blowdown from the Consolidated Incineration Facility would be sent to RCRA-permitted disposal vaults or shallow land disposal. For purposes of this EIS, it is assumed that 70 percent of the stabilized ash and blowdown would require RCRA-permitted disposal and 30 percent could be sent to shallow land disposal (Hess 1994e, 1995c). TE

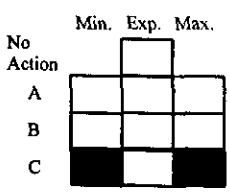
For the expected waste forecast, DOE would construct and operate a containment building, primarily to decontaminate mixed wastes, but hazardous waste (metal debris and bulk equipment comprising approximately 3 percent of the forecast hazardous waste) would also be decontaminated in the facility

(see Appendix B.6). Decontaminated metals would be reused onsite, decreasing the requirements for new products, or would be sold as scrap. Materials that could not be decontaminated would be sent to the non-alpha vitrification facility for treatment. It is assumed that 80 percent of the materials would be decontaminated. Spent decontamination solutions are assumed to constitute 50 percent of the volume of
TE the incoming waste feed and would be treated at the non-alpha vitrification facility (Hess 1994e, 1995c).

The containment building would also segregate and decontaminate lead components from disassembled equipment, as described in Section 2.5.1.1. Lead components that could not be segregated or decontaminated would be sent to the non-alpha vitrification facility for treatment. Due to the limited use of chemical decontamination methods, the spent decontamination solutions are assumed to constitute
TE 10 percent of the volume of the incoming lead waste (Hess 1994e).

TE DOE would construct and operate a vitrification facility for non-alpha wastes (see Appendix B.18). Hazardous waste metals that could not be decontaminated, spent decontamination solutions from the containment building, and other hazardous wastes (approximately 47 percent of the forecast hazardous wastes) (with the exception of aqueous liquids sent to the M-Area Air Stripper and PCB wastes) would be vitrified in the new facility. The non-alpha vitrification facility would have a dedicated wastewater treatment unit for treating scrubber and quench waters. This closed-loop system would return treated wastewater to the vitrification facility to be used in the treatment process. Vitrified waste would be sent to RCRA-permitted disposal or shallow land disposal. For purposes of this EIS, it is assumed that 50 percent of the vitrified wastes would require RCRA-permitted disposal and 50 percent would be sent
TE to shallow land disposal (Hess 1994e, 1995c).

Because the metal decontamination process and the non-alpha vitrification facility would not be operational until 2006, DOE would continue to send hazardous waste either offsite or to the Consolidated Incineration Facility for treatment and disposal until 2006.



2.5.4.2 Hazardous Waste – Minimum and Maximum Waste Forecasts

TE For alternative C – minimum and maximum forecasts, DOE would change the way it manages some of the hazardous waste (see Figure 2-25). In the minimum forecast, almost 80 percent of the anticipated
TE 30-year waste volume would be generated prior to 2006 (WSRC 1994d). Most of this hazardous waste
TC (75 percent of the minimum forecast) would be treated and disposed of offsite because onsite treatment

capability would be limited at that time. In the maximum forecast, most of the hazardous waste (57 percent) would be treated at the non-alpha vitrification facility. This change is due primarily to increases in the quantity of contaminated soils by approximately 10,000 cubic meters (3.53×10^5 cubic feet) per year over the expected forecast. TE TC

Table 2-30 describes the percentage of hazardous waste distributed among the various treatment options under the minimum and maximum waste forecasts.

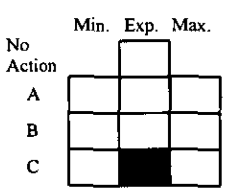
Table 2-30. Hazardous waste treatment options for alternative C minimum and maximum waste forecasts.[a,b]

Minimum waste forecast	Maximum waste forecast
75 percent sent offsite	34 percent sent offsite
3 percent incinerated	1 percent incinerated
17 percent vitrified	57 percent vitrified

TC

a. Source: Hess (1995c).
b. Percentages are approximate.

2.5.5 MIXED WASTE



2.5.5.1 Mixed Waste – Expected Waste Forecast

For alternative C – expected waste forecast, DOE would manage mixed waste as it would under the no-action alternative presented in Section 2.2.5. Under alternative C, DOE also would implement extensive treatments that stabilize and immobilize mixed waste to minimize long-term impacts to the environment. Figure 2-26 summarizes the proposed management practices for alternative C – expected waste forecast, which consist of the following: TE

- Store tritiated oil to allow time for radioactive decay.

- Send radioactive PCB wastes offsite for treatment; residuals would be returned to SRS for shallow land disposal. TC

TC

TC

TE

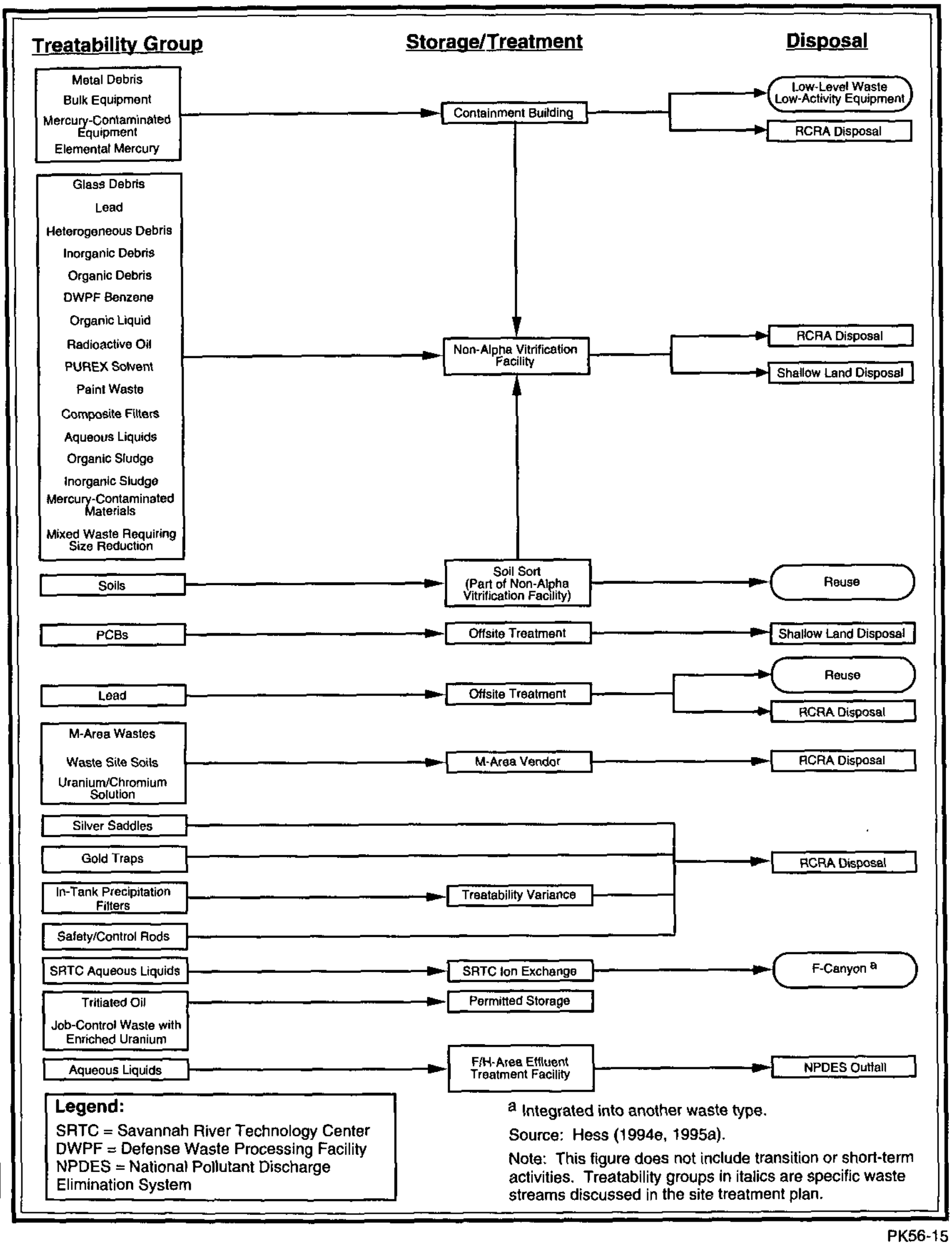


Figure 2-26. Mixed waste management plan for alternative C expected waste forecast.

- Send lead offsite for decontamination and recycling; treatment residuals would be returned for RCRA-permitted disposal at SRS.

In addition, DOE would:

- Construct a containment building to decontaminate metal debris and bulk equipment.

- Roast and retort contaminated process equipment to remove mercury and treat mercury by amalgamation at the containment building.

- Oxidize a small quantity of reactive metal waste at the containment building.

- Operate the Consolidated Incineration Facility from 1996 to 2005 to incinerate certain mixed wastes until the non-alpha vitrification facility begins operating, including benzene generated by the Defense Waste Processing Facility, organic and aqueous liquid wastes, PUREX solvent, radioactive oil, and organic and inorganic sludges.

- Construct and operate a non-alpha waste vitrification facility to replace the Consolidated Incineration Facility in 2006. The facility would include the capability to separate soil with nondetectable amounts of contamination from contaminated soil (contaminated soil would be treated in the vitrification process and clean soil would be used onsite as backfill material).

- Construct and operate the M-Area Vendor Treatment Facility to vitrify wastes generated by M-Area electroplating operations and the specific wastes identified in the *SRS Proposed Site Treatment Plan*. TE

2.5.5.1.1 Containerized Storage

For alternative C – expected waste forecast, DOE would continue to store mixed waste in the three mixed waste storage buildings, the M-Area storage building, and on three storage pads. The non-alpha mixed waste (i.e., waste with less than 10 nanocuries per gram of transuranics) that is now stored on the transuranic waste pads would be transferred to the mixed waste storage pads. To allow for storage of mixed waste while treatment facilities are being constructed, DOE would construct additional storage buildings as needed. Based on the usable capacity of Building 643-43E, DOE estimates that a maximum of 79 additional buildings would be required by 2005 (Hess 1995c). See Section 2.4.5.1.1 for additional information. TC

DOE would continue to store low-level PCB wastes in one of the mixed waste storage buildings pending treatment of the PCB component of the wastes at an offsite commercial facility. Once treated, the
TE residuals would be returned to SRS for shallow land disposal (Hess 1994e).

DOE would continue to generate radioactive oil and store it in containers in the areas where it is generated at SRS. There would be sufficient radioactive oil storage capacity over the next 30 years. See Section 2.4.5.1.1 for additional information.

TC DOE would continue to store mercury-contaminated tritiated oil generated by SRS tritium facilities and job-control waste contaminated with solvents and enriched uranium at the mixed waste storage facilities for the duration of the 30-year analysis period. See Section 2.4.5.1.1 for additional information.

2.5.5.1.2 Treatment and/or Tank Storage

TE For alternative C – expected forecast, DOE would continue treatment and tank storage practices for Savannah River Technology Center aqueous wastes and PUREX solvent waste storage, as described in Section 2.2.5.2. In addition, the 568-cubic-meter (150,000-gallon) Organic Waste Storage Tank would be used to store mixed organic waste generated at the Defense Waste Processing Facility. DOE would begin to treat this waste at the Consolidated Incineration Facility, assuming it begins operating in 1996. If the Consolidated Incineration Facility begins operating, additional tank storage capacity would not be required.

DOE would continue to use the M-Area Process Waste Interim Treatment/Storage Facility tanks to store concentrated mixed wastes from the M-Area Liquid Effluent Treatment Facility. DOE plans to treat six
TE types of wastes (listed in Appendix B.15) currently stored in the M-Area Process Waste Interim Treatment/Storage Facility tanks and the M-Area storage building by a vitrification process in the M-Area Vendor Treatment Facility. The M-Area Vendor Treatment Facility was identified as the
TE TC preferred option for two additional wastes (listed in Appendix B.15) in the *SRS Proposed Site Treatment Plan*. See Section 2.4.5.1.2 for additional information. DOE has submitted a RCRA permit application requesting interim status for a pad in M-Area to store the vitrified wastes and stabilized ash and blowdown wastes from the Consolidated Incineration Facility.

TE For alternative C – expected waste forecast, DOE would construct and operate a containment building for decontaminating mixed metal debris and bulk equipment comprising approximately 10 percent of the forecast mixed waste generation. This facility would begin to operate in 2006. Decontaminated debris and equipment from which hazardous constituents were removed would be managed as low-activity equipment waste. Materials that could not be decontaminated and the secondary wastes from the decontamination process would be transferred to the non-alpha vitrification facility for treatment. It is assumed that 80 percent of the materials could be decontaminated. Spent decontamination solutions are assumed to constitute 50 percent of the original volume of the materials to be decontaminated (Hess 1994e). The containment building would also treat mercury-contaminated process equipment by roasting and retorting (i.e., heating the equipment to drive off the mercury as a vapor and collecting and condensing the mercury back to a liquid form). The mercury removed from the process equipment and elemental mercury wastes would be treated by amalgamation (i.e., alloying the liquid mercury with inorganic reagents such as copper, nickel, gold, or zinc to create a semi-solid amalgam). See Appendix B.6 for a description of the containment building. TE

DOE would begin operating the Consolidated Incineration Facility in 1996 to treat approximately 7 percent of the anticipated mixed waste volume, including benzene waste generated by the Defense Waste Processing Facility, organic and aqueous liquid wastes, PUREX solvent, paint waste, radioactive oil, and organic debris. Stabilized ash and blowdown waste from the Consolidated Incineration Facility would be sent to RCRA-permitted disposal or shallow land disposal. For purposes of this EIS, it is assumed that 70 percent of the stabilized ash and blowdown would require RCRA-permitted disposal and 30 percent would be sent to shallow land disposal (Hess 1994e, 1995c). See Section 2.4.5.1.2 for additional information. TC TE TE

DOE would construct and operate a non-alpha vitrification facility to treat approximately 55 percent of the forecast mixed waste, including glass, heterogeneous, inorganic, and organic debris; contaminated soils; organic and inorganic sludges; mercury-contaminated materials; composite filters; benzene waste generated by the Defense Waste Processing Facility; organic and aqueous liquids; PUREX solvent; paint waste; radioactive oil; organic and inorganic debris; and lead. Because the non-alpha vitrification facility would produce a more stable waste form, it would replace the Consolidated Incineration Facility, assuming the non-alpha vitrification facility begins operating in 2006 (Hess 1994e, 1995c). DOE would request a treatability variance to allow lead to be vitrified to produce a more stable waste form than would be achieved through macroencapsulation, the specified technology for lead under the land disposal restrictions treatment standards. This facility would provide a soil sort capability to separate uncontaminated and contaminated soils and concrete. It is assumed that 60 percent of the incoming soils and concrete would be contaminated and would require treatment by vitrification prior to disposal. Uncontaminated soils (16 percent of the forecast waste generation) would be used onsite as backfill material (Hess 1995c). Liquids from the offgas system would be sent to a dedicated wastewater treatment unit and the reclaimed water would be returned to the offgas system for recycling. The vitrified waste would be sent to RCRA-permitted disposal or shallow land disposal. For purposes of this TC TE TE

EIS, it is assumed that 50 percent of the vitrified waste would require RCRA-permitted disposal and
TE 50 percent would be sent to shallow land disposal (Hess 1994e). See Appendix B.18 for a description of the non-alpha vitrification facility.

DOE would begin shipping low-level PCB wastes for treatment of the PCB fraction by a commercial facility. The treated residuals would be returned to SRS for shallow land disposal.

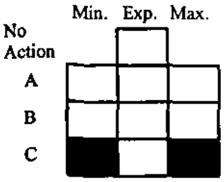
DOE would begin shipping lead to an offsite commercial facility for decontamination. It is assumed that 80 percent of the lead would be decontaminated. The commercial facility would return residuals from the decontamination process and the portion of the lead waste that could not be decontaminated to SRS
TE for disposal (Hess 1994e).

2.5.5.1.3 Disposal

DOE submitted an application for a RCRA permit to SCDHEC for 10 Hazardous Waste/Mixed Waste Disposal Vaults. For purposes of this EIS, DOE based its proposed disposal vaults on the design of its current Hazardous Waste/Mixed Waste Disposal Vault. See Section 2.2.5.3 for additional information.

As described in Section 2.2.5.3 for the no-action alternative, DOE would construct and operate
TE RCRA-permitted vaults for disposal of mixed wastes. In addition, under the alternative C expected waste forecast, DOE would manage hazardous wastes in these vaults and would also use them to dispose of 70 percent of the stabilized ash and blowdown from the Consolidated Incineration Facility, and 50 percent of the vitrified waste from the non-alpha vitrification facility. The first of the RCRA-permitted disposal vaults would begin accepting wastes in 2002, and DOE would construct
TE additional vaults as needed (Hess 1994e, 1995c). Refer to Section 2.5.7 for mixed waste disposal capacity projections over the 30-year period.

Mixed wastes subject to RCRA because they exhibit a hazardous characteristic may be treated in a way that eliminates the characteristic (e.g., toxic metals may be immobilized). If mixed wastes are treated in this manner, they need not be disposed of in RCRA-permitted disposal vaults, and DOE would dispose of them as low-level wastes. DOE would send 30 percent of the stabilized ash and blowdown from the Consolidated Incineration Facility, 50 percent of the vitrified wastes from the non-alpha vitrification facility, and stabilized residuals from the treatment of radioactive PCB wastes to shallow land disposal
TE (Hess 1994e, 1995c). Refer to Section 2.5.7 for projections of low-level waste disposal capacity over the 30-year period.



2.5.5.2 Mixed Waste – Minimum and Maximum Waste Forecasts

For alternative C – minimum and maximum waste forecasts, DOE would manage mixed waste somewhat differently than for the expected waste forecast (see Figure 2-26). The non-alpha vitrification facility would play a larger role in the minimum waste forecast (approximately 65 percent of the forecast waste volume would be vitrified) and a smaller role in the maximum forecast (approximately 49 percent of the forecast waste volume would be vitrified) than in the expected forecast. Table 2-31 describes the percentage of mixed waste distributed among the various treatment options under the minimum and maximum waste forecasts. TE TC

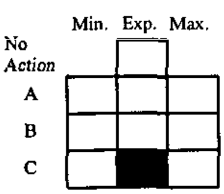
Table 2-31. Mixed waste treatment options for alternative C minimum and maximum waste forecasts.[a,b]

Minimum waste forecast	Maximum waste forecast
27 percent to soil sort facility	54 percent to soil sort facility
65 percent vitrified	49 percent vitrified
13 percent to containment building	11 percent to containment building
12 percent incinerated	9 percent incinerated

TC

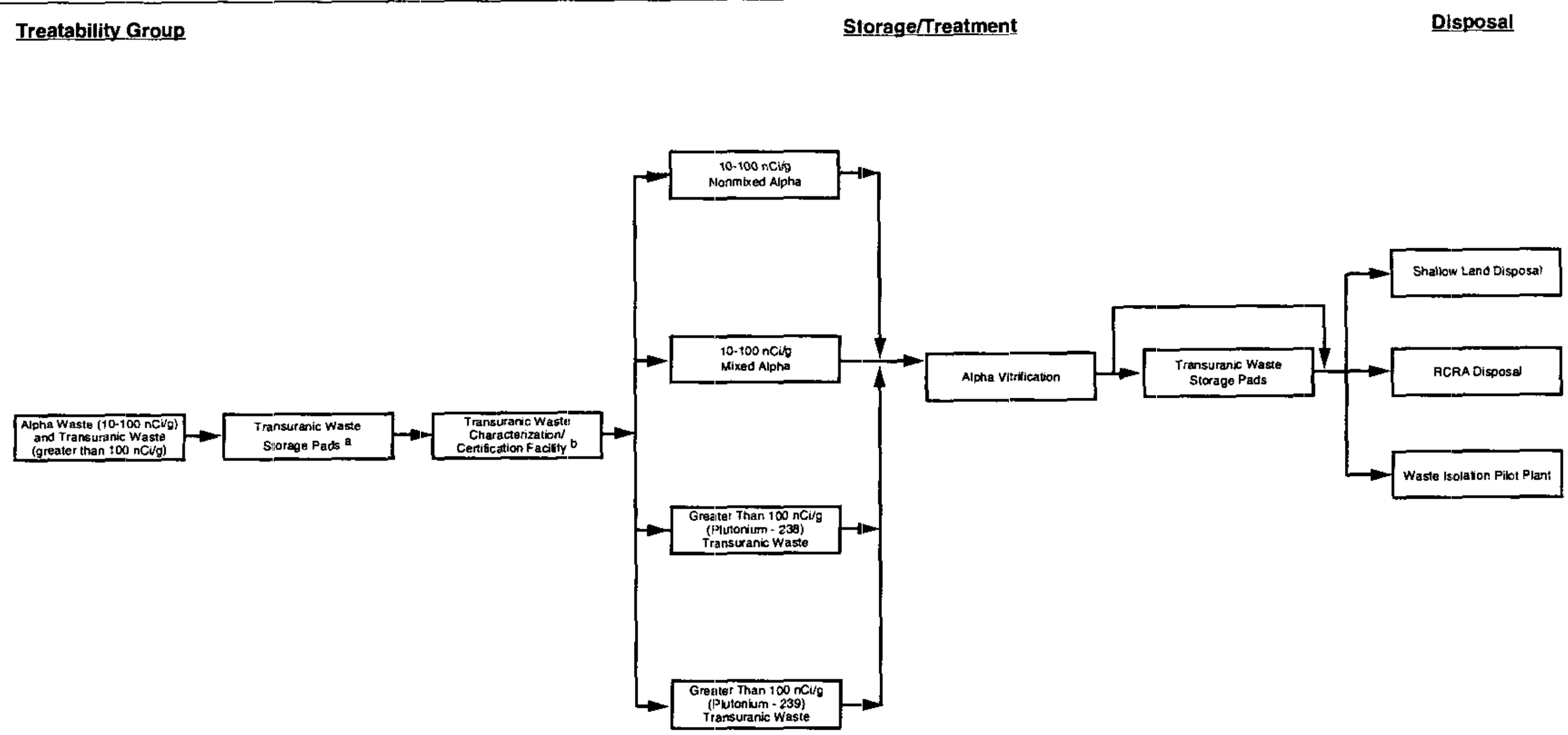
a. Source: Hess (1995c).
b. Percentages are approximate.

2.5.6 TRANSURANIC AND ALPHA WASTE



2.5.6.1 Transuranic and Alpha Waste – Expected Waste Forecast

For alternative C – expected waste forecast, DOE would perform more aggressive treatment activities to achieve the most stable long-term waste forms for alpha and transuranic waste. Figure 2-27 summarizes the proposed alpha and transuranic waste management practices under alternative C, which include the



[a] Other storage locations are being considered: this analysis is based on using transuranic waste storage pads only

[b] Waste certification activities consolidated with characterization/certification facility

Source: Hess (1994e).

TC

PK56-15

Figure 2-27. Transuranic waste management plan for alternative C expected waste forecast.

waste management activities under the no-action alternative described in Section 2.2.6. The additional management practices are:

- Construct and operate a transuranic waste characterization/certification facility to characterize, treat, repackage, and certify waste for disposal.

- Construct and operate an alpha vitrification facility to vitrify alpha wastes (10 to 100 nanocuries per gram) and transuranic wastes (greater than 100 nanocuries per gram).

- Operate the Consolidated Incineration Facility from 1996 to 2005 to burn some newly generated alpha wastes until the transuranic waste characterization/certification facility and alpha vitrification facility begin operating. TC

- Construct facilities to dispose of nonmixed and mixed alpha waste onsite in the low-activity waste vaults, RCRA-permitted disposal vaults, or shallow land disposal.

- Return Rocky Flats incinerator ash for consolidation and treatment with similar wastes at that facility. TC

- Send transuranic waste to the Waste Isolation Pilot Plant (Hess 1995a).

2.5.6.1.1 Storage

For alternative C – expected waste forecast, DOE would continue to accumulate alpha and transuranic waste in the same manner as described for the no-action alternative (Section 2.2.6). In the draft EIS, DOE assumed that alpha wastes generated between 1995 and 2006 would be stored for processing at the transuranic waste characterization/certification facility. However, facilities would be available during that time period that could accept these wastes. DOE proposes to use these facilities to treat or dispose of alpha wastes and reduce the need for additional storage capacity. Under alternative C, DOE would burn 50 percent of the alpha wastes (both mixed and nonmixed) generated each year from 1996 to 2005 in the Consolidated Incineration Facility. The remainder of the mixed and nonmixed alpha waste generated each year would be certified for disposal in the RCRA-permitted disposal vaults and low-activity waste vaults, respectively. DOE would package and store containers on transuranic waste storage pads to await processing; retrieve drums from mounded storage on Transuranic Waste Storage Pads 2 through 6; and construct new pads as needed. As a result of the reconfiguration of the transuranic TC

TE waste storage pads (see Appendix B.30) and the addition of newly generated waste, 11 additional transuranic waste storage pads would be required by 2006 (Hess 1995c).

TE DOE assumed that the Waste Isolation Pilot Plant would operate from 1998 to 2018 and would accept SRS transuranic waste (WSRC 1995). The transuranic waste stored on transuranic waste storage pads or generated after 2018 would be vitrified and returned to a single pad for storage (Hess 1994e, 1995c). The disposition of these wastes has not yet been determined.

2.5.6.1.2 Treatment

DOE would return a small amount (0.1 cubic meter) of Rocky Flats incinerator ash currently stored at SRS to that facility for consolidation and treatment with similar wastes. The *SRS Proposed Site Treatment Plan* concluded that it was not cost effective to develop treatment at SRS for this small quantity of material. Rocky Flats is currently investigating alternatives for management of the ash.

TC

Under alternative C, DOE would burn 50 percent of the mixed and nonmixed alpha wastes generated each year from 1996 to 2005 in the Consolidated Incineration Facility. These waste constitute approximately 3 percent of the anticipated waste. For purposes of this EIS, it is assumed that 70 percent of the stabilized ash and blowdown from treatment of mixed alpha wastes would require RCRA-permitted disposal and 30 percent would be sent to shallow land disposal. All stabilized ash and blowdown from incineration of nonmixed alpha wastes would be sent to shallow land disposal.

DOE would construct and operate the transuranic waste characterization/certification facility to perform assays and intrusive characterizations of the waste in drums, culverts, and boxes stored on transuranic waste storage pads. The facility would begin operating in 2007 to characterize the waste for separation into four categories (described in Section 2.4.6) to facilitate treatment and disposal. Bulk waste would be reduced in size to fit into 55-gallon drums. The facility would process the entire inventory of alpha
TC and transuranic waste, all newly generated transuranic waste, and alpha waste generated after 2007 to meet the waste acceptance requirements of the alpha vitrification facility. These wastes constitute
TE approximately 94 percent of the forecast volume (Hess 1994e, 1995c).

It is assumed that the transuranic waste characterization/certification facility would reduce the overall
TE waste volume by 30 percent as a result of processing and repackaging (Hess 1994e). Waste
TC characterization would segregate the incoming wastes (17 percent nonmixed alpha, 14 percent mixed alpha, 55 percent plutonium-238, and 14 percent plutonium-239) so the alpha vitrification facility could

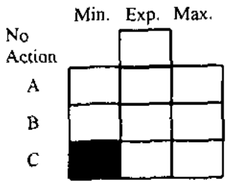
properly blend the waste for vitrification to achieve a high-quality vitrified form. Further details on these topics are in Appendix B.31 (Hess 1995a). TE

Beginning in 2008, DOE would vitrify the alpha waste before disposal because vitrification substantially reduces the volume of waste. The alpha waste would be blended with transuranic waste during vitrification, and most of the vitrified waste would be classified as transuranic waste. DOE would seek a treatability variance for vitrification of mixed alpha wastes when vitrification did not comply with the land disposal restrictions treatment standards (e.g., lead waste subject to specified technologies other than vitrification). The variance would have to demonstrate that vitrification achieved a final waste form equivalent to that otherwise required (Hess 1994e). TC TE

The vitrified waste produced by the alpha vitrification facility would be returned to the transuranic waste characterization/certification facility for disposal certification. The facility would certify the vitrified waste forms as nonmixed alpha, mixed alpha, or transuranic (Hess 1994e). A detailed description of the alpha vitrification facility can be found in Appendix B.1. TE

2.5.6.1.3 Disposal

A 92 percent reduction in transuranic and alpha waste volume would be realized for alternative C – expected waste forecast. Nonmixed alpha waste (30 percent of the processed volume) would be sent to shallow land disposal or low-activity waste vaults (5 and 25 percent of the processed volume, respectively), and treated mixed alpha waste (18 percent of the processed volume) would be sent to RCRA-permitted disposal. Half of the waste [73 cubic meters (2,600 cubic feet) per year] would be shipped to the Waste Isolation Pilot Plant for disposal as vitrified transuranic waste starting in 2008 and ending in 2018. By 2018, DOE would have shipped for disposal a quantity of transuranic waste equal to less than 1 percent of the total capacity of the Waste Isolation Pilot Plant. Two percent of the processed volume would be certified as transuranic waste and remain stored at SRS on one transuranic waste storage pad (Hess 1994e, 1995c). TC TC TE

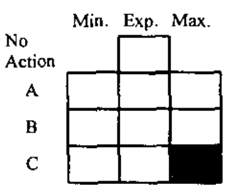


2.5.6.2 Transuranic and Alpha Waste – Minimum Waste Forecast

Because of the smaller volumes anticipated in the minimum waste forecast, DOE would manage
TC transuranic and alpha waste in a slightly different manner than in the expected waste forecast. To accommodate the transuranic waste inventory and newly generated waste in alternative C minimum
TE waste forecast, DOE would need two additional transuranic waste storage pads by 2004 (Hess 1995c).

TC The characterization, treatment, and disposal methods would remain the same as in the expected waste forecast; however, by 2018, more transuranic waste (57 percent of the processed volume) would have been shipped to the Waste Isolation Pilot Plant for disposal. By 2024, DOE would have stored the
TE remaining vitrified transuranic waste (2 percent of the processed volume) on one transuranic waste storage pad (Hess 1995c).

TC DOE would ship 53 cubic meters (1,900 cubic feet) per year of transuranic waste to the Waste Isolation Pilot Plant between 2008 and 2018. The waste volume disposed of under this alternative would
TE constitute less than 1 percent of the repository's total capacity (Hess 1995c).

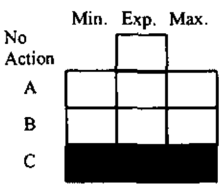


2.5.6.3 Transuranic and Alpha Waste – Maximum Waste Forecast

In alternative C – maximum waste forecast, DOE would manage transuranic and alpha waste differently because of the dramatic change in the volume of the transuranic waste (25 times that in the expected forecast) from increased environmental restoration. DOE would also experience an increase in mixed alpha waste (45 percent compared to 16 percent in the expected forecast) for processing and disposal as a result of the assumptions in the maximum forecast (WSRC 1994c).

TC By 2006, DOE would require 1,166 additional transuranic waste storage pads to store the newly
TE generated waste. The treatment and disposal methods would be the same as for the expected forecast; however, the waste characteristics would differ from the expected forecast (9 percent non-mixed alpha, 47 percent mixed alpha, 35 percent plutonium-238, and 9 percent plutonium-239). Most of the waste

would be disposed of as transuranic waste (85 percent of the processed waste volume) (Hess 1995c). DOE would ship 2,164 cubic meters (76,400 cubic feet) per year of transuranic waste to the Waste Isolation Pilot Plant from 2008 through 2018. The transuranic waste volume disposed of under this case would constitute 14 percent of the repository's total capacity (Hess 1995c). By 2024, DOE would need only one transuranic waste storage pad to store the remaining processed and packaged vitrified transuranic waste. TC TE



2.5.7 SUMMARY OF ALTERNATIVE C FOR ALL WASTE TYPES

Under alternative C, DOE would continue the waste management activities listed in the no-action alternative (Section 2.2.7), including construction of additional storage capacity for mixed, transuranic, and alpha wastes. Less storage capacity would be needed for this alternative than is required for the no-action alternative. In addition, DOE would: TE

- Construct and operate a containment building to treat mixed and hazardous wastes.

- Roast and retort contaminated process equipment to remove mercury and treat mercury by amalgamation at the containment building.

- Oxidize a small quantity of reactive metal waste at the containment building.

- Construct and operate a non-alpha vitrification facility for hazardous, mixed, and low-level wastes to replace the Consolidated Incineration Facility in the year 2006. The facility would include low-level and mixed waste soil sort capability to separate soil with nondetectable amounts of contamination from contaminated soil (this would replace the mobile soil sort facility in alternative A).

- Decontaminate and recycle low-activity equipment waste (metals) offsite. Treatment residues would be returned to SRS for shallow land disposal.

- Send radioactive PCB wastes offsite for treatment; residuals would be returned to SRS for shallow land disposal.

- Operate the Consolidated Incineration Facility for mixed (benzene generated by the Defense Waste Processing Facility, organic and aqueous liquid wastes, PUREX solvents, radioactive oil, and organic and inorganic sludges), hazardous, alpha, and low-level wastes until the non-alpha and alpha vitrification facilities became operational.

TC

- Construct and operate a transuranic waste characterization/certification facility to characterize, treat, repackage, and certify waste for disposal.

- Construct and operate an alpha vitrification facility to vitrify alpha wastes (10 to 100 nanocuries per gram) and transuranic wastes (greater than 100 nanocuries per gram).

- Dispose of transuranic wastes at the Waste Isolation Pilot Plant.

- Construct RCRA-permitted disposal vaults or use shallow land disposal to dispose of stabilized ash and blowdown waste from the incineration process and vitrified waste from the non-alpha vitrification facility.

- Store tritiated oil to allow time for radioactive decay.

TC

- Construct and operate the M-Area Vendor Treatment Facility to vitrify wastes generated by M-Area electroplating operations and the specific wastes identified in the *SRS Proposed Site Treatment Plan* (WSRC 1995).

TC

- Construct facilities to dispose of nonmixed and mixed alpha wastes onsite in the low-activity waste vaults, RCRA-permitted disposal vaults, or by shallow land disposal.

TC

The largest impacts to land outside of E-Area would occur for the maximum waste forecast (approximately 775 acres for alternative C). This land would be required for storage facilities until treatment begins in approximately 2006. However, by 2024, most of the waste would have been treated and disposed of and the land required outside of E-Area would be only 4 acres under alternative C. It is highly unlikely that the technology used to store the waste volumes under the minimum and expected forecasts would be suitable for the maximum forecast. However, to compare the different treatment configurations among the alternatives of this EIS, the comparison was made assuming the same technology would be applied for all three waste forecasts. For example, DOE would likely construct the 11 additional transuranic waste storage pads required for the expected case; however, DOE would probably elect not to use the same technology if it called for 1,166 pads under the maximum forecast.

A timeline for the ongoing and proposed waste management activities for alternative C is provided in Figure 2-28. DOE would operate the existing facilities until the proposed facilities could be designed, constructed, and begin operating. For all the waste types except high-level waste, the activities that would occur from 1995 to about 2006 are shown in Figure 2-29. The proposed waste management activities as they would occur after 2008 are shown in Figure 2-30. TE

The additional management facilities under alternative C and a comparison to those required under the no-action alternative are provided in Table 2-32.

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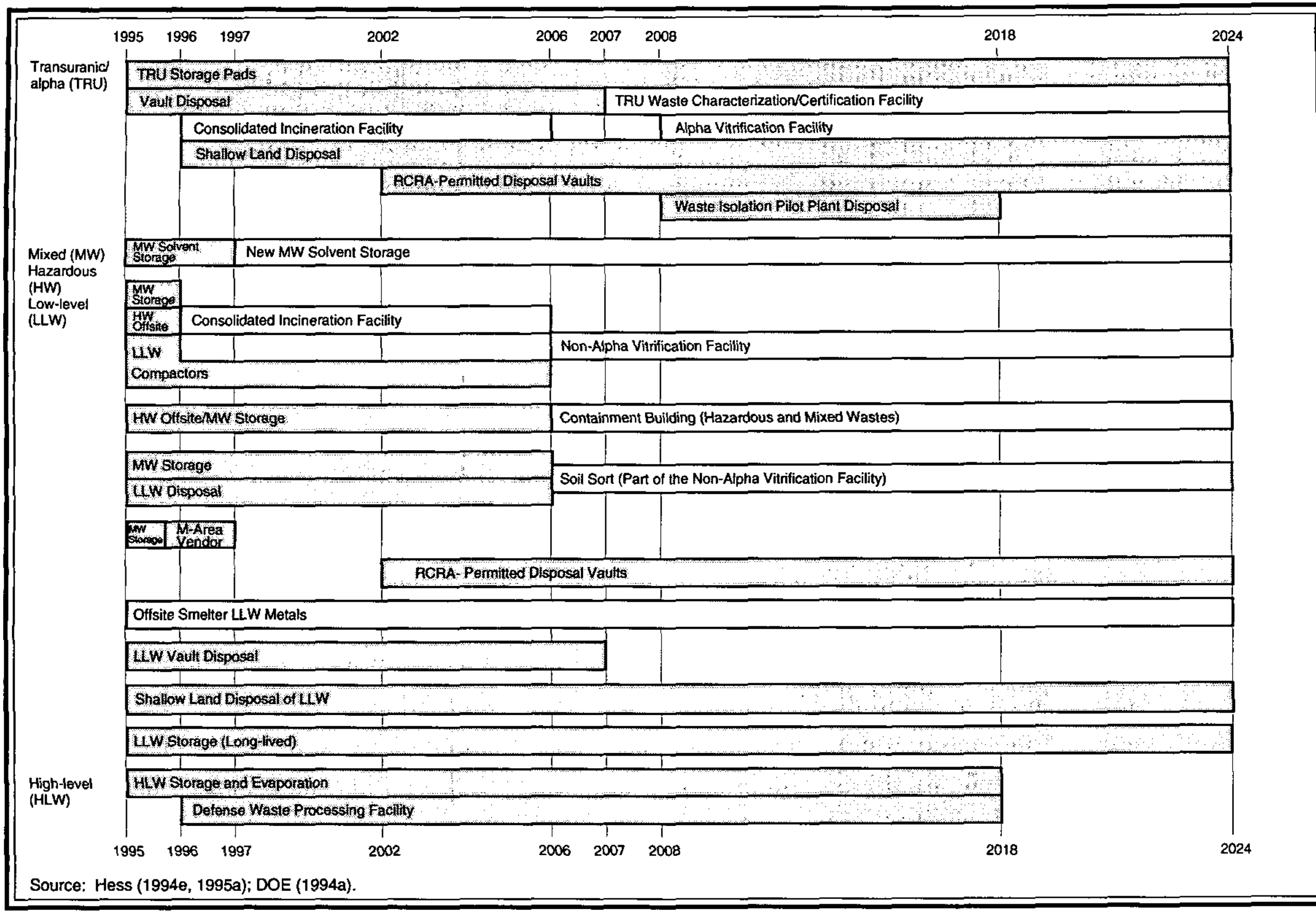

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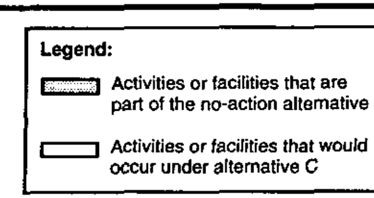

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Figure 2-28. Timeline for waste management facilities in alternative C.

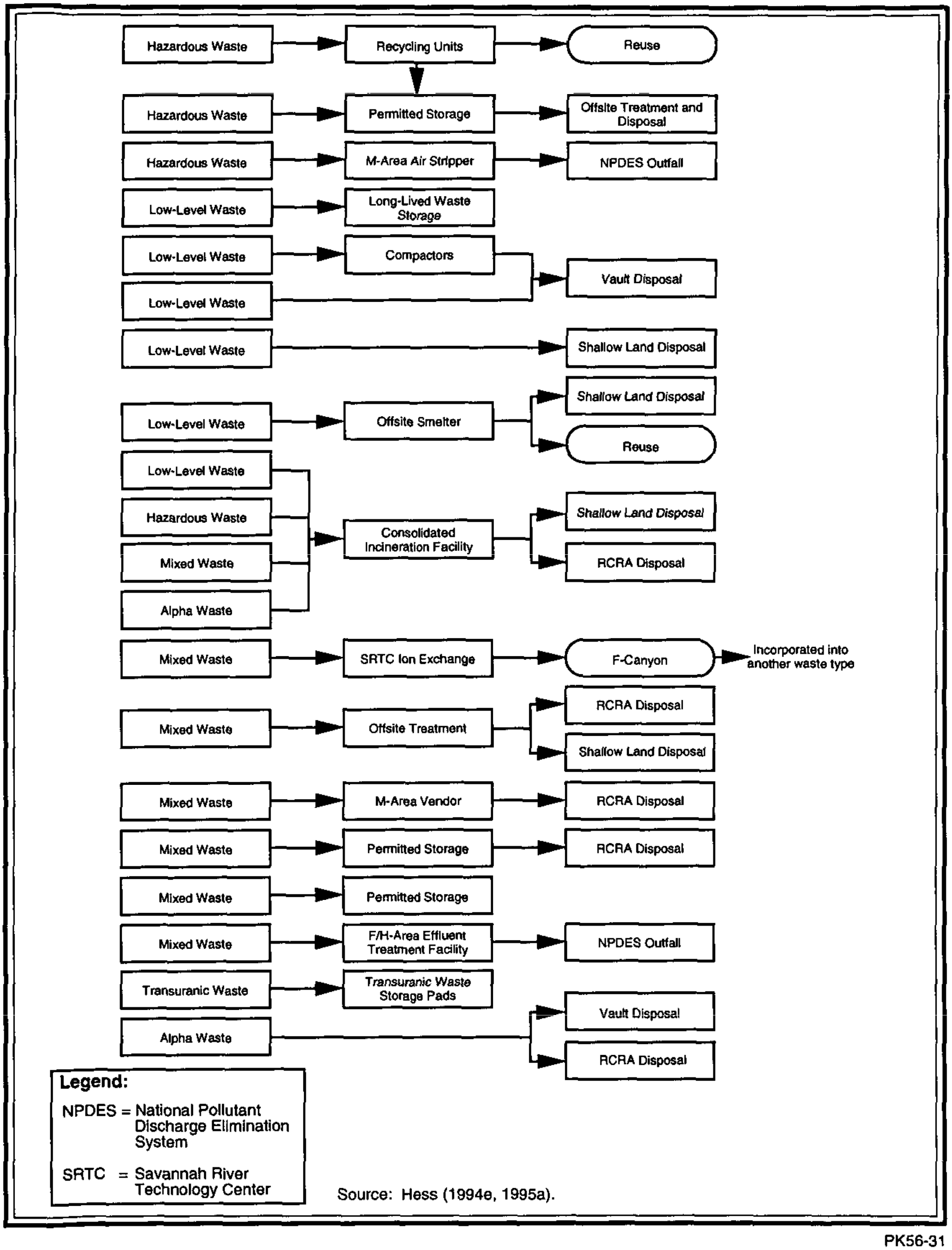

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Figure 2-29. Summary of waste management activities in alternative C until the year 2006.

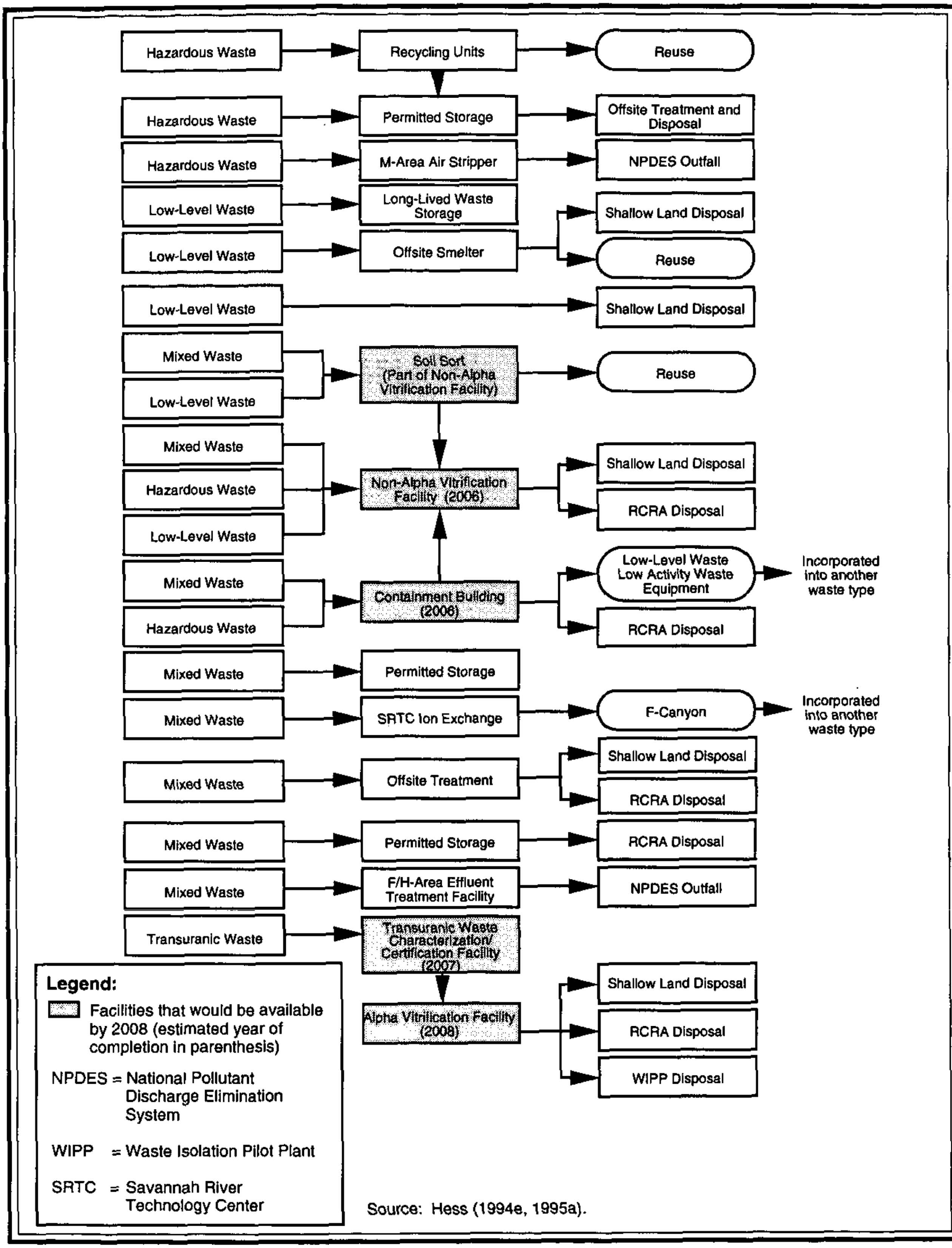

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Figure 2-30. Summary of waste management activities in alternative C after the year 2008.

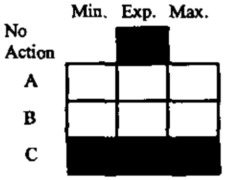
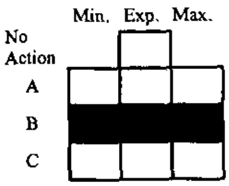


Table 2-32. Comparison of treatment, storage, and disposal facilities under alternative C and the no-action alternative.

	Minimum	Expected	Maximum	
No action		**STORAGE:** Buildings 24 long-lived low-level waste 291 mixed waste Pads 19 transuranic and alpha waste Tanks 4 organic waste in S-Area 26 organic waste in E-Area 43 aqueous waste in E-Area **TREATMENT:** Continue ongoing and planned waste treatment activities **DISPOSAL:** 29 shallow land disposal trenches 10 low-activity waste vaults 5 intermediate-level waste vaults 1 RCRA disposal facility		
C	**STORAGE:** Buildings 7 long-lived low-level waste 39 mixed waste Pads 2 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast **DISPOSAL:** 45 shallow land disposal trenches 2 low-activity waste vaults 1 intermediate-level waste vault 10 RCRA disposal facilities	**STORAGE:** Buildings 24 long-lived low-level waste 79 mixed waste Pads 11 transuranic and alpha waste **TREATMENT:** Continue ongoing and planned waste treatment activities; treat limited quantities of mixed and PCB wastes offsite; begin smelting low-activity equipment waste offsite; operate the Consolidated Incineration Facility for low-level, hazardous and mixed waste until vitrification facility is available; construct and operate a hazardous and mixed waste containment building; construct and operate a non-alpha vitrification facility for low-level, hazardous, and mixed wastes; construct and operate a transuranic waste characterization/certification facility; construct and operate an alpha vitrification facility **DISPOSAL:** 123 shallow land disposal trenches 2 low-activity waste vaults 2 intermediate-level waste vaults 40 RCRA disposal facilities	**STORAGE:** Buildings 34 long-lived low-level waste 652 mixed waste Pads 1,166 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast **DISPOSAL:** 576 shallow land disposal trenches 5 low-activity waste vaults 3 intermediate-level waste vaults 111 RCRA disposal facilities	TC TE



2.6 Alternative B – Moderate Treatment Configuration and DOE's Preferred Alternative

As described at the beginning of Chapter 2, DOE bases alternative B on a moderate treatment configuration that would balance the short-term and long-term impacts of waste management at SRS. This is DOE's preferred alternative. DOE believes that alternative B offers the best combination of treatment, storage, and disposal technologies to ensure cost-effective protection of the environment. This section discusses the activities and facilities that would be used for alternative B – expected waste forecast, and discusses changes in such activities and facilities that would be required to accommodate the minimum and maximum waste forecasts.

Alternative B is identical to the no-action alternative with respect to the management of liquid high-level waste. This section discusses changes, if any, necessary in alternative B to accommodate the minimum and maximum forecasts of this waste. Alternative B includes several treatment facilities for low-level, TC mixed, and transuranic wastes, including an offsite smelter, offsite volume reduction and repackaging, a mobile soil sort facility, and the Consolidated Incineration Facility for low-level wastes; the Consolidated Incineration Facility, containment building, and non-alpha vitrification facility for mixed wastes; and the transuranic waste characterization/certification facility and alpha vitrification facility for transuranic and alpha wastes. Hazardous waste would also be treated at SRS in the Consolidated Incineration Facility and containment building. By implementing these treatments, DOE would appreciably decrease the amount of additional storage capacity for mixed and transuranic wastes from that required under the no-action alternative. Mixed waste storage would peak in 2005 and transuranic and alpha waste storage in 2006; the number of storage facilities would then decrease as new treatment facilities begin to operate. Small quantities of mixed and PCB wastes would be sent offsite for treatment, and transuranic wastes would be sent to the Waste Isolation Pilot Plant for disposal when that facility becomes available. The waste volumes sent to shallow land disposal and to RCRA disposal facilities would increase from those projected for the no-action alternative due to the increased volume of treatment residuals. Sections 2.6.3, 2.6.4, 2.6.5, and 2.6.6, respectively, discuss the proposed treatment, storage, and disposal activities for low-level, hazardous, mixed, and transuranic wastes under alternative B. Section 2.6.7 summarizes the activities and facilities under alternative B and compares them to those required under the no-action alternative.

2.6.1 POLLUTION PREVENTION/WASTE MINIMIZATION

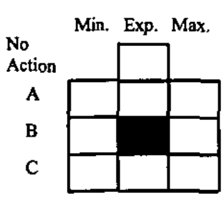
The ongoing waste minimization activities described under the no-action alternative (Section 2.2.1) would continue under alternative B for each waste forecast. In addition to ongoing waste minimization activities, DOE would initiate other activities to reduce low-level and mixed wastes, as summarized in Table 2-33. TE

Table 2-33. Waste minimization activities under alternative B.[a]

Minimization activity	Treatability group	Waste forecast	Estimated amount of reduction (cubic meters)[b]
Source reduction	Low-level job-control waste	Expected	850
		Minimum	850
		Maximum	850
Recycle metal into waste containers (beneficial reuse)	Low-activity waste metal	Expected	17,965
		Minimum	9,838
		Maximum	53,792
Reuse decontaminated lead	Mixed waste lead	Expected	2,408
		Minimum	1,053
		Maximum	6,140
Sort soil to divert for beneficial reuse	Mixed waste soils and concrete	Expected	35,332
		Minimum	9,549
		Maximum	176,024
Sort soil to divert for beneficial reuse	Low-activity and suspect soil and small concrete pieces	Expected	25,214
		Minimum	9,980
		Maximum	403,888

TC

a. Sources: Hess (1994e, 1995c).
b. *To convert to cubic feet, multiply by 35.31.*



2.6.1.1 Pollution Prevention/Waste Minimization – Expected Waste Forecast

The SRS high-volume disposables task team would initiate source reduction to prevent the generation of an estimated 850 cubic meters (30,000 cubic feet) of low-level job-control waste (Stone 1994d), as described in Section 2.5.1.1.

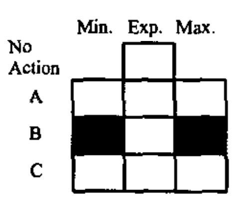
DOE plans to build on the beneficial reuse integrated demonstration program (Section 2.2.1.4.2) and help private industry establish a facility to recycle radioactively contaminated steel (Boettinger 1994a). Under the beneficial reuse program, stainless steel and carbon steel from low-activity equipment waste

TC would be recycled. An estimated 17,965 cubic meters (6.34×10^5 cubic feet) of low-activity equipment waste would be recycled under this program (including low-activity waste from the decontamination of
TE mixed waste metal debris and bulk equipment) (Hess 1995c). See Section 2.5.1.1 for additional information.

TC TE An estimated 3,010 cubic meters (1.10×10^5 cubic feet) of lead that has radioactive contamination on its surface would be available for recycling (Hess 1995c). Because the recycling initiative is also part of alternative A, the reader can find additional information in Section 2.4.1.1.

DOE would minimize low-activity waste soil, suspect soil, and small pieces of concrete, and mixed waste soils and concrete by sorting and diverting the materials with contamination in amounts that cannot be detected to beneficial uses at SRS. A mobile unit would sort for low-level waste, and the non-alpha vitrification facility would use another process to sort for mixed waste (see Appendixes B.18 and B.28 for the descriptions). The throughput is estimated to be 136,820 cubic meters (4.83×10^6 cubic feet) [48,489 cubic meters (1.71×10^6 cubic feet) of low-level wastes and 88,331 cubic meters
TC TE (3.12×10^6 cubic feet) of mixed wastes]. DOE estimates that a total of 60,546 cubic meters (2.14×10^6 cubic feet) [25,214 cubic meters (8.90×10^5 cubic feet) from the low-level and 35,332 cubic meters (1.25×10^6 cubic feet) from the mixed wastes] would be diverted for beneficial reuse (Hess 1995c).

DOE would not recycle large pieces of concrete with radioactive contamination (i.e., low-level waste) by reusing it as aggregate in construction or road-building projects. DOE would use waste minimization techniques to reduce the amount of waste generated by the waste management facilities. See Section 2.5.1.1 for additional information.

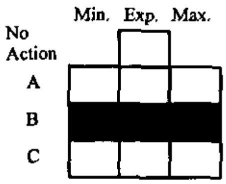


2.6.1.2 Pollution Prevention/Waste Minimization – Minimum and Maximum Waste Forecasts

For alternative B – minimum and maximum waste forecasts, DOE would continue to support the beneficial reuse program. Table 2-33 presents the estimated volumes of low-activity equipment waste available for recycling under each forecast.

DOE would also recycle lead with radioactive contamination on its surface. Table 2-33 presents the estimated volumes of radioactively contaminated lead that would be available for recycling under each forecast.

DOE would minimize the volume of low-activity waste soil, suspect soil and concrete, and mixed waste soils and concrete that would require disposal. Table 2-33 presents the estimated volumes that would be available for beneficial reuse from the low-level and mixed waste soils.



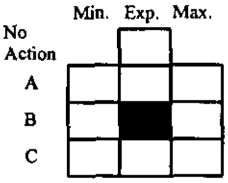
2.6.2 HIGH-LEVEL WASTE – EXPECTED, MINIMUM, AND MAXIMUM WASTE FORECASTS TE

Under alternative B, DOE would treat liquid high-level radioactive waste as it would under the no-action alternative (see Section 2.2.2, Figure 2-9). For each waste forecast, DOE would continue current management activities, from receipt and storage of liquid high-level waste in tanks to preparation, processing, and treatment into forms suitable for final disposal. The high-level waste volumes that would be generated over the next 30 years in addition to the existing inventory of high-level waste [approximately 1.31×10^5 cubic meters (3.45×10^7 gallons)] are given in Table 2-23. TE

These volumes are not additive because newly generated waste would be reduced approximately 75 percent via evaporation. These volumes would not require construction of new high-level waste tanks or facilities. Instead, DOE proposes to continue current management practices and manage waste with the objective of emptying the tanks and immobilizing SRS's inventory of liquid high-level waste by 2018 (DOE 1994a).

DOE would not change the proposed high-level waste management practices as a result of the smaller volumes anticipated in the minimum waste forecast (45 percent less than the expected forecast). The only difference in management practices as a result of the larger volumes anticipated in the maximum waste forecast (23 percent more than the expected forecast) would be to operate the existing evaporators at higher rates to maintain adequate reserve tank storage capacity. TE

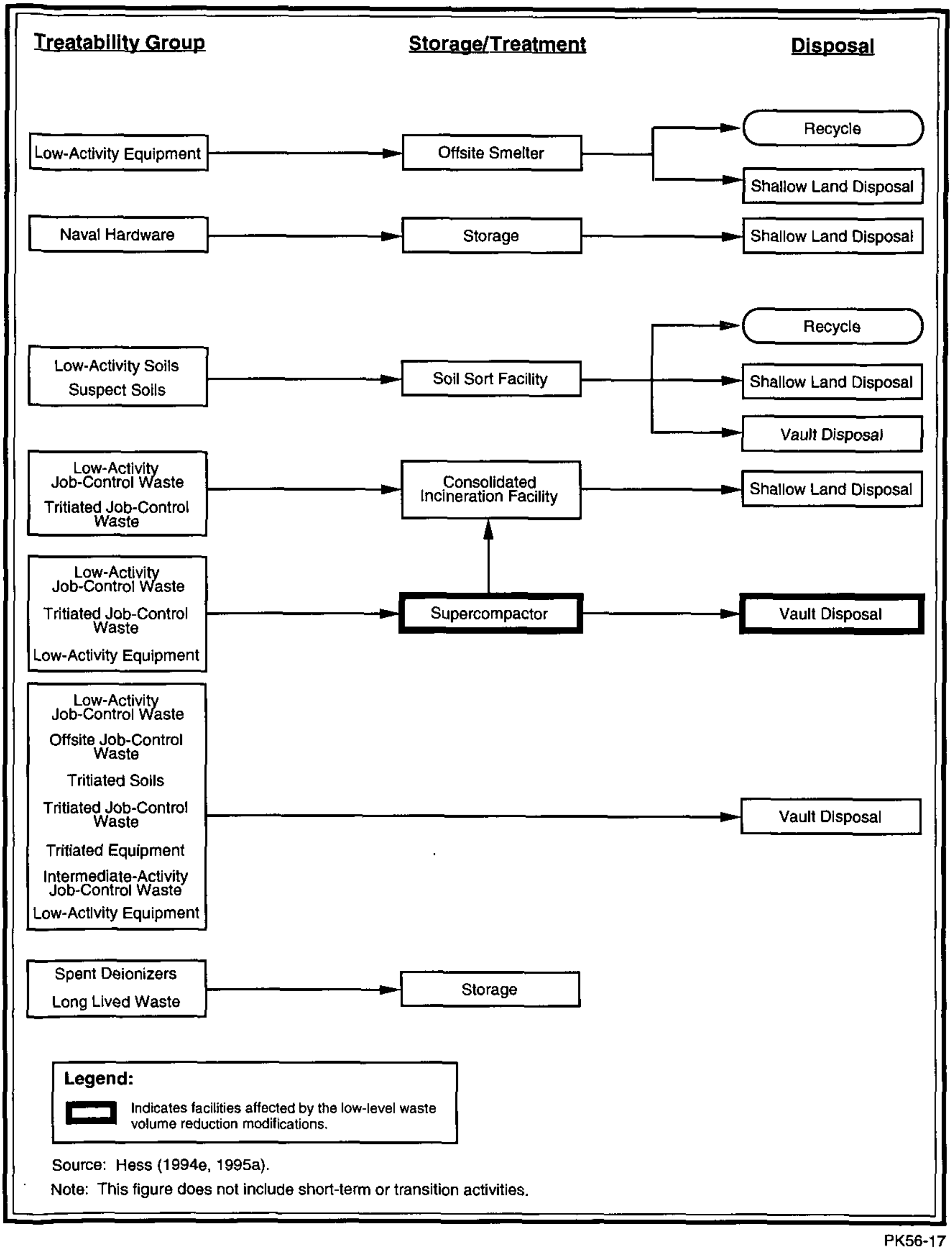
2.6.3 LOW-LEVEL WASTE



2.6.3.1 Low-Level Waste – Expected Waste Forecast

For alternative B – expected waste forecast, low-level waste would be managed in a manner similar to the no-action alternative presented in Section 2.2.3. Under alternative B, DOE also would implement moderate low-level waste treatment. The management practices proposed under alternative B of the draft EIS are summarized in Figure 2-31. In the draft EIS, DOE proposed to construct and operate a supercompactor at SRS to compact some low-activity equipment, low-activity job-control waste, and tritiated job-control waste. DOE proposed to continue operating the existing compactors from 1995 to 2005, until the supercompactor began operating in 2006. The existing compactors and proposed supercompactor would have received 4 percent and 21 percent, respectively, of the waste volume expected under alternative B of the draft EIS. Low-level wastes that could not be accepted at the three existing compactors before the supercompactor began to operate, such as bulk equipment, and job-control waste in excess of the available compactor capacity would have been disposed of in low-level waste vaults. Appendix B.29 provides a description of the supercompactor, the wastes that it would have processed, and impacts associated with operation of the supercompactor as proposed under alternative B in the draft EIS.

DOE has determined that low-level waste volume reduction technologies such as supercompaction are available at commercial facilities. Immediate utilization of commercial capacity in lieu of construction of a supercompactor at SRS would enable DOE to reduce its needs for low-level waste disposal vaults. Offsite waste treatment could also be used during maintenance periods of onsite treatment facilities. DOE would not use commercial capacity to reduce the volume of tritiated job-control waste. These wastes would be placed directly into intermediate-level waste vaults and DOE does not anticipate shortfalls in vault capacity to accommodate these wastes. The processing of tritiated job-control waste was the major contributor to the emissions from low-level waste supercompaction at SRS as evaluated in the draft EIS. Such emissions could be a greater concern at an offsite location because the facility would likely be closer to the site boundary than it would have been at SRS. DOE now proposes to ship only some low-activity job-control and equipment waste to a commercial facility for volume reduction beginning in fiscal year 1996. These low-activity wastes would be treated by supercompaction, size



TC

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Figure 2-31. Low-level waste management plan for alternative B – expected waste forecast in the draft EIS. TC

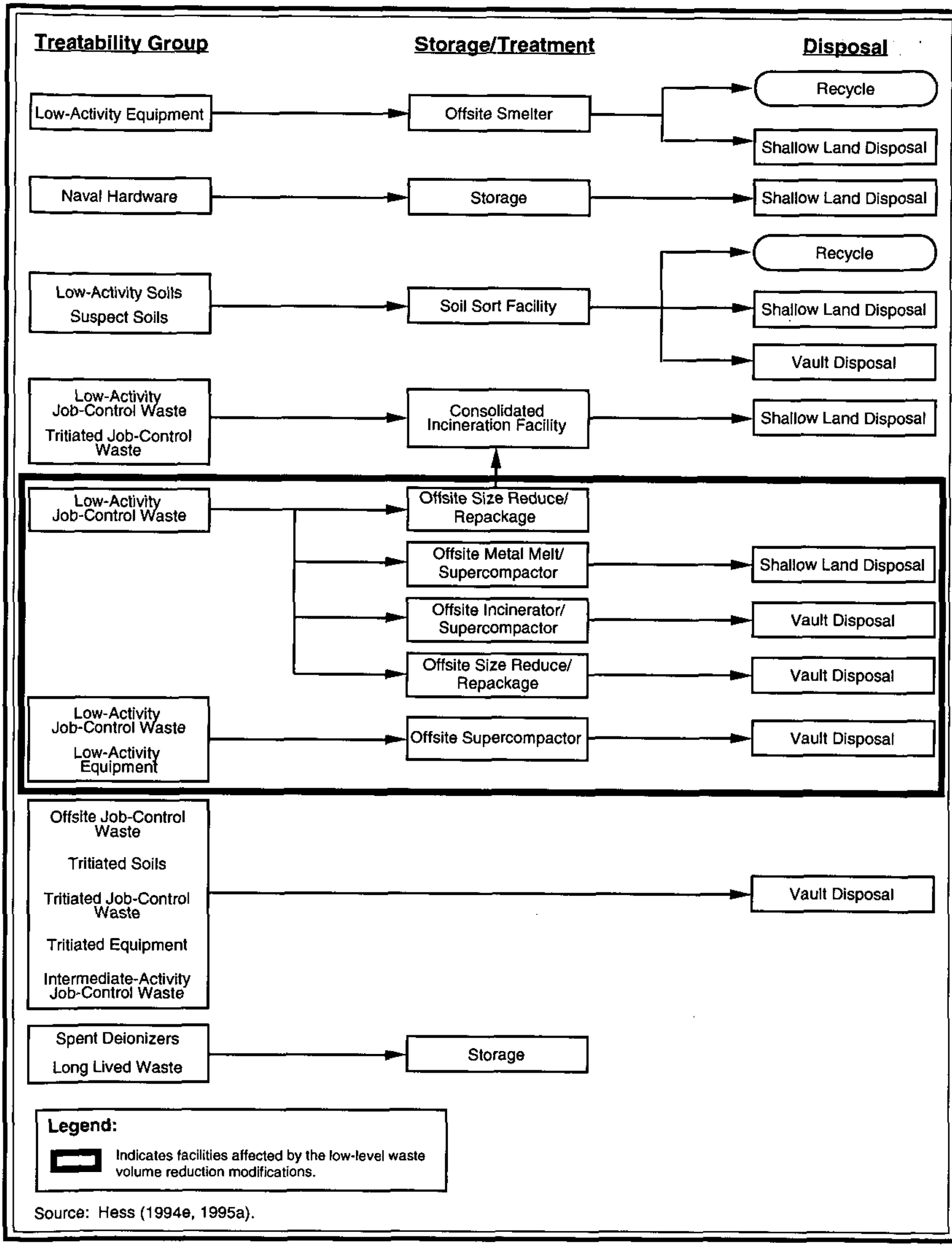
TC reduction (e.g., sorting, shredding, melting), and incineration. Figure 2-32 summarizes the proposed management practices for low-level waste as modified, which are listed below:

- Decontaminate and recycle low-activity equipment waste (metals) offsite. Treatment residues would be returned to SRS for shallow land disposal.
- Operate a mobile soil sort facility to segregate uncontaminated soils for beneficial reuse.
- Operate the Consolidated Incineration Facility to incinerate low-activity and tritiated wastes.
- TC Reduce the volume of low-activity job-control and equipment waste at commercial facilities; residuals would be returned to SRS for further treatment or disposal.

Under alternative B, DOE would store process water deionizers and other long-lived wastes (less than 1 percent of the forecast low-level waste) in long-lived waste storage buildings in E-Area, as discussed in Section 2.2.3.3. The existing building would reach capacity by 2000, and 24 additional buildings would TE be constructed over the 30-year analysis period (Hess 1995c).

Under alternative B, DOE would ship low-activity job-control and equipment waste (which constitute 36 and 5 percent, respectively, of the forecast low-level waste) to a commercial facility for volume reduction beginning in fiscal year 1996. Uncompacted wastes already in the low-activity waste vault would be retrieved and sent to a commercial facility. For purposes of assessment, the facility was assumed to be located in Oak Ridge, Tennessee. In terms of transportation and surrounding population, this location is representative of the range of possible locations. These low-activity wastes would be treated by volume reduction technologies. For purposes of analysis in the EIS, it is assumed that the TC waste would be treated offsite as follows:

- 60 percent supercompacted
- 20 percent reduced in size and repackaged for incineration in the Consolidated Incineration Facility
- 10 percent incinerated; the resulting ash would be supercompacted



TC

TE

Figure 2-32. Low-level waste management plan for alternative B – expected waste forecast.

- 5 percent reduced in size and repackaged for disposal

- 5 percent melted, the melt residue would be supercompacted

TC After treatment, the wastes would be repackaged and returned to SRS for further treatment (e.g., burned at the Consolidated Incineration Facility) or disposal. Treatment residuals would be placed in vaults for disposal, except for residuals from metal melting, which would be sent to shallow land disposal. Refer to Appendix B.20 for a description of commercial volume reduction and associated impacts.

Assuming operation of the Consolidated Incineration Facility in 1996, DOE would incinerate combustible low-activity and tritiated job-control wastes, which constitute approximately 41 percent of the forecast waste, including low-activity wastes repackaged by a commercial facility. DOE would send stabilized incinerator ash and blowdown wastes to shallow land disposal. Refer to Appendix B.5 for a description of the Consolidated Incineration Facility, the projected low-level waste throughputs, and the projected impacts of their treatment at that facility.

TC

Under alternative B, DOE would operate a mobile soil sort facility to separate contaminated and uncontaminated soils. In the draft EIS, DOE proposed to begin operating the soil sort facility in 2006. However, since the soil sort facility would be a mobile unit, and such units are currently available, DOE now proposes to begin operating the facility in 1996. The facility would process low-activity and suspect soils, which constitute approximately 9 percent of the anticipated low-level waste. DOE would send suspect soil to shallow land disposal and low-activity soil to vault disposal in 1995, until the soil sort facility begins operating. It is assumed that 60 percent of the incoming low-activity soil and 40 percent of the incoming suspect soil would be contaminated and would require management as low-level waste (Hess 1994e). It is also assumed that 30 percent of the contaminated soil would require vault disposal because of radiological performance assessment restrictions, and 70 percent would be sent to shallow land disposal (Hess 1994e). Uncontaminated soil (5 percent of the low-level waste forecast) would be reused onsite as backfill. Refer to Appendix B.28 for a description of the soil sort facility.

TC

TC

TE

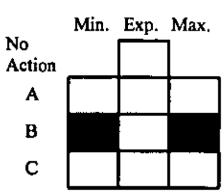
TC Under alternative B, DOE would ship low-activity equipment waste (metals), constituting 3 percent of the low-level waste forecast, to a commercial facility for decontamination by smelting. DOE anticipates that the offsite smelter would decontaminate 90 percent of the low-activity equipment waste for recycle and return 10 percent of the original volume to SRS for shallow land disposal (Hess 1994k). Refer to Appendix B.19 for a description of the smelter.

TE

A 75-percent reduction in low-level waste disposal volume would be realized from the treatment activities under alternative B. TC

DOE would send naval hardware to shallow land disposal, as described in Section 2.2.3.4. DOE would also send suspect soil to shallow land disposal in 1995 until the soil sort facility is available. After 1996, DOE would send a portion of the contaminated soil from the sort facility to shallow land disposal. DOE would also send stabilized ash and blowdown wastes from the Consolidated Incineration Facility and stabilized residuals from the offsite smelter to shallow land disposal. TC

DOE would continue to dispose of suspect soils in the engineered low-level trench as described in Section 2.2.3.1. DOE would dispose of low-activity waste and intermediate-activity waste in the existing low-level waste vaults, as described in Sections 2.2.3.1 and 2.2.3.2. As a result of the low-level waste volume reduction initiatives that would be implemented under alternative B, the existing low-activity waste vault would not reach capacity until the year 2011. The existing intermediate-level waste vault would reach capacity by 1999. Additional vaults would be constructed as required. DOE would dispose of intermediate-activity job-control waste, offsite job-control waste, tritiated soil, and tritiated equipment without treatment for the entire 30-year period. DOE would also dispose of a portion of tritiated job-control waste without treatment. Compacted and supercompacted wastes would also be disposed of at the low-level waste vaults. TC



2.6.3.2 Low-Level Waste – Minimum and Maximum Waste Forecasts

For alternative B – minimum and maximum waste forecasts, DOE would change the way it manages low-level waste (see Figure 2-32). The changes from waste management practices described for the expected forecast are primarily the result of the larger volume of soils anticipated in the maximum forecast. Low-activity and suspect soils would constitute approximately 48 percent of the maximum forecast (compared to 9 percent in the expected forecast). DOE would realize a 75 percent reduction in disposal volume from treatment in the expected waste forecast, a 79-percent reduction in the minimum waste forecast, and a 64-percent reduction in the maximum waste forecast. Table 2-34 lists the percentage of low-level waste distributed among the various treatment and disposal options under the minimum and maximum forecasts. TC

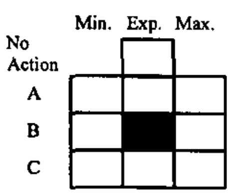
Table 2-34. Low-level waste treatment and disposal options for alternative B minimum and maximum waste forecasts.[a,b]

TC

Minimum waste forecast	Maximum waste forecast
Treatment options	Treatment options
1 percent to compactors	<1 percent to compactors[c]
45 percent volume reduced offsite	19 percent volume reduced offsite
46 percent incinerated	20 percent incinerated
5 percent to soil facility	49 percent to soil facility
Disposal options	Disposal options
69 percent to vaults	47 percent to vaults
31 percent to shallow land disposal	53 percent to shallow land disposal

a. Source: Hess (1995c).
b. Percentages are approximate.
TE c. "<" is read as "less than."

2.6.4 HAZARDOUS WASTE

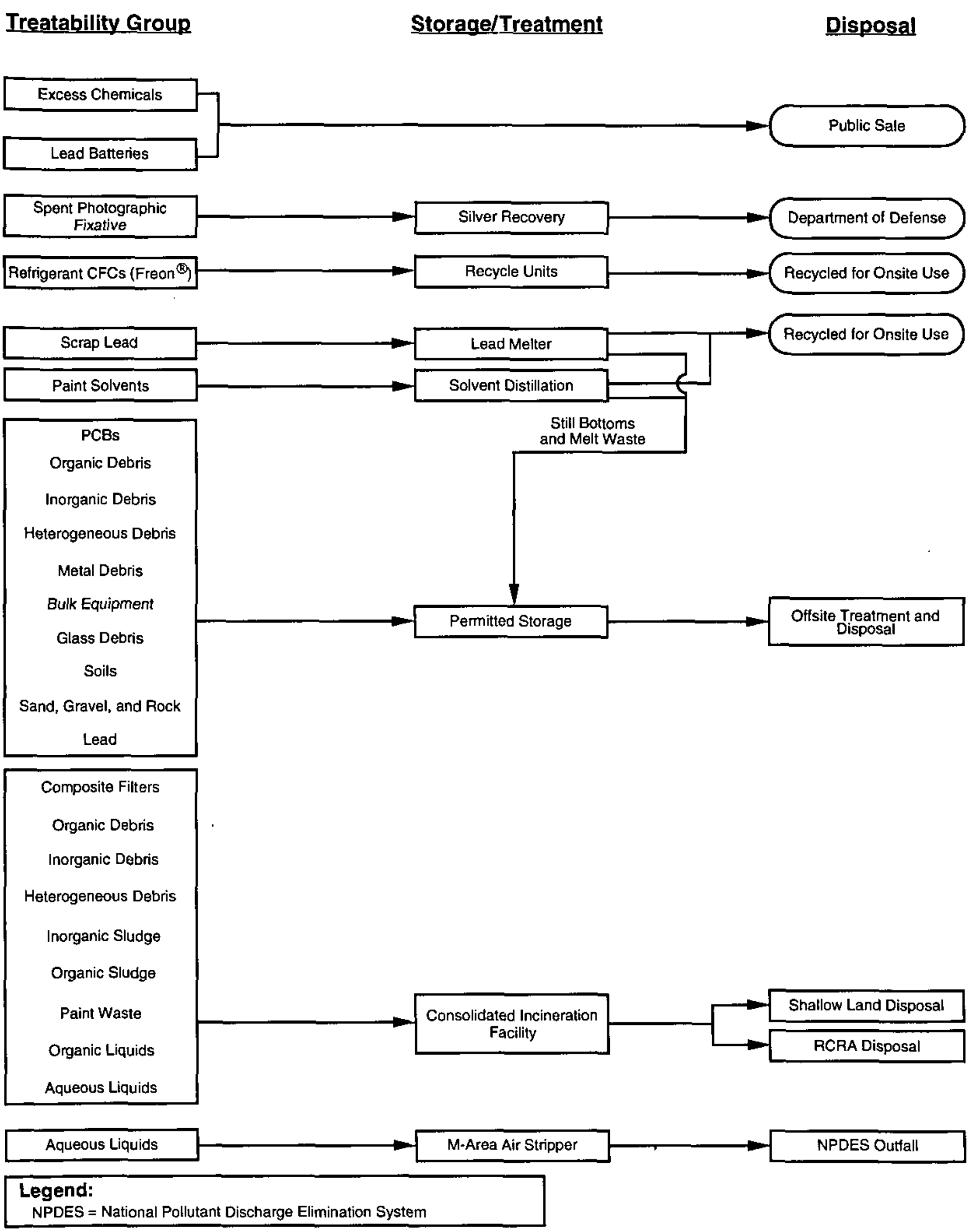


2.6.4.1 Hazardous Waste - Expected Waste Forecast

As discussed in Section 2.4.4.1, DOE does not plan to construct facilities solely for the treatment of hazardous wastes. However, facilities that DOE plans to use for mixed waste could be used for hazardous wastes to the extent excess capacity is available. Figure 2-33 summarizes the proposed hazardous waste management practices under alternative B. In addition to the management practices for hazardous waste under the no-action alternative (Section 2.2.4), under alternative B DOE would treat hazardous wastes onsite as follows:

- Construct and operate a containment building for decontamination of debris/metals for use onsite or to be sold as scrap.

- Operate the Consolidated Incineration Facility and incinerate selected hazardous wastes.



Source: Hess (1994e, 1995a).

Note: This figure does not include transition or short-term activities.

TC

TE

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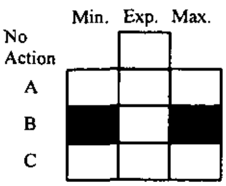
Figure 2-33. Hazardous waste management plan for alternative B – expected waste forecast.

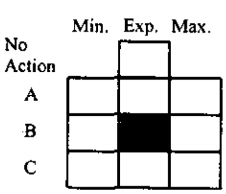
TC In the draft EIS, DOE proposed to burn only filters, paint waste, organic liquids, and aqueous liquids in the Consolidated Incineration Facility. To more fully use the treatment capacity of that facility, DOE proposes to also burn organic and inorganic sludges and 50 percent of the organic, inorganic, and heterogeneous debris under alternative B.



2.6.4.2 Hazardous Waste – Minimum and Maximum Waste Forecasts

For alternative B – minimum and maximum forecasts, DOE would manage hazardous waste the same as TC in the expected waste forecast. Most of the hazardous waste would continue to be sent offsite for treatment and disposal (85 percent for expected, 89 percent for minimum, and 87 percent for maximum waste forecasts). However, several hazardous wastes (composite filters, paint waste, organic liquids, aqueous liquids; inorganic, organic, and heterogeneous debris; inorganic and organic sludges) would be treated in the Consolidated Incineration Facility, assuming it begins operating in 1996. These wastes TC represent approximately 8 to 9 percent of the hazardous waste quantities forecast for the next 30 years for all cases (Hess 1995c).

2.6.5 MIXED WASTE



2.6.5.1 Mixed Waste – Expected Waste Forecast

TE For alternative B – expected waste forecast, DOE would manage mixed waste as under the no-action alternative presented in Section 2.2.5. Under alternative B, DOE also would implement moderate mixed waste treatments as summarized in Figure 2-34, which consist of the following:

- Store tritiated oil to allow time for radioactive decay.

- TE Send elemental mercury and mercury-contaminated materials to the Idaho National Engineering Laboratory for treatment; residuals would be returned to SRS for RCRA-permitted disposal or shallow land disposal.

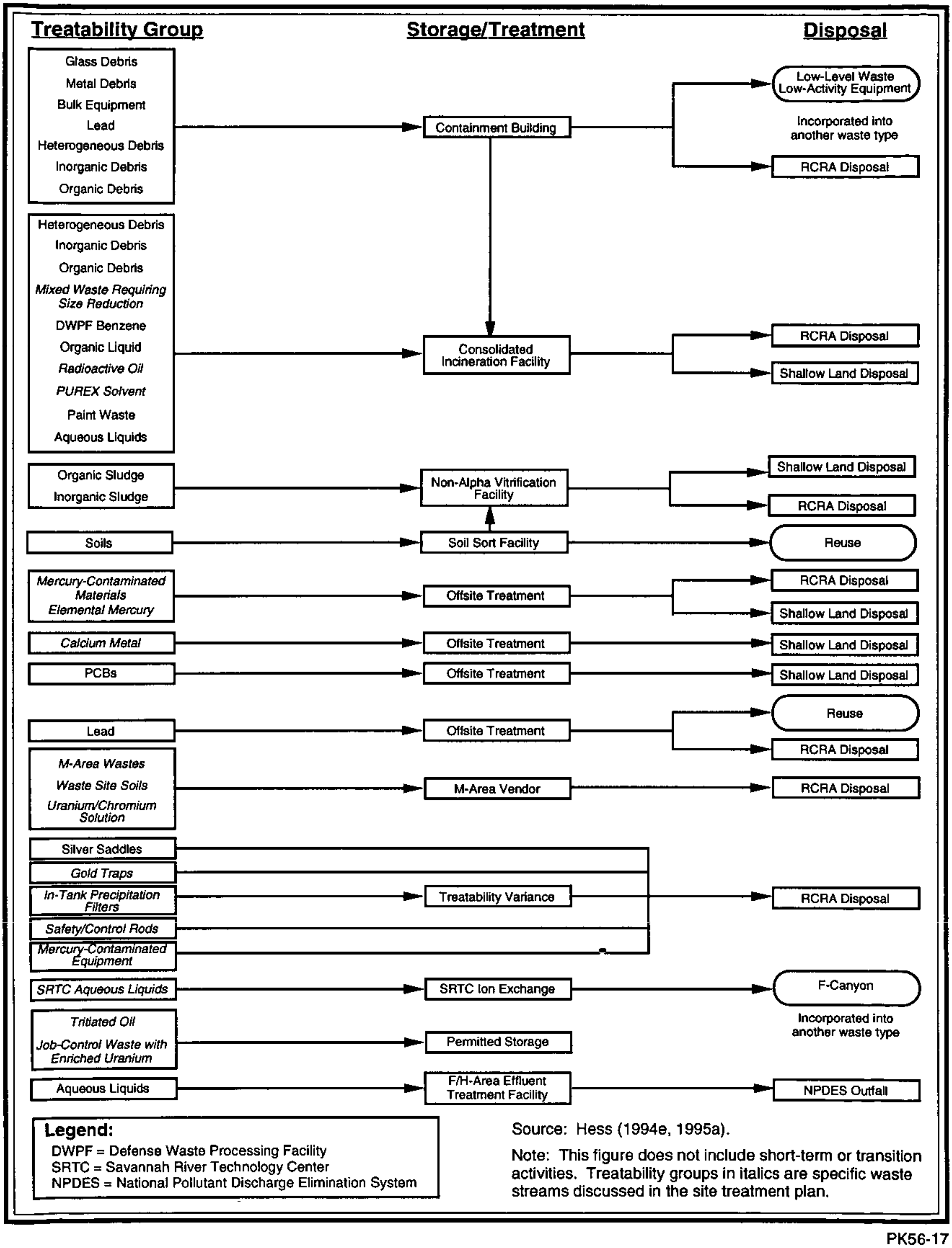


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Figure 2-34. Mixed waste management plan for alternative B – expected waste forecast.

TC
- Send calcium metal waste to the Los Alamos National Laboratory for treatment; residuals would be returned to SRS for shallow land disposal.

TE
- Send radioactive PCB wastes offsite for treatment; residuals would be returned to SRS for shallow land disposal.

- Send lead offsite for decontamination and recycling; treatment residuals would be returned for RCRA-permitted disposal at SRS.

In addition, under alternative B DOE would:

- Construct a containment building to decontaminate mixed wastes (mostly debris) and macroencapsulate contaminated debris and lead wastes.

- Complete construction of and operate the Consolidated Incineration Facility to burn certain mixed wastes such as benzene generated by the Defense Waste Processing Facility, organic and aqueous liquid wastes, decontamination solutions from the containment building, PUREX solvent, and radioactive oil.

- Construct disposal vaults for stabilized ash and blowdown from the incineration process.

- Construct and operate a non-alpha vitrification facility to treat soils and organic and inorganic sludges. This vitrification facility would include a soil sort capability to separate clean soil from contaminated soil. Contaminated soil would be treated in the vitrification process and clean soil would be used onsite as backfill material.

- Construct disposal capacity for vitrified waste from the non-alpha vitrification facility.

- Construct and operate the M-Area Vendor Treatment Facility to vitrify wastes generated by
TE M-Area electroplating operations and the specific wastes in the *SRS Proposed Site Treatment Plan*.

TC

2.6.5.1.1 Containerized Storage

TE For alternative B – expected waste forecast, DOE would continue to store mixed waste in the three mixed waste storage buildings, the M-Area storage building, and on three storage pads. The non-alpha mixed waste (i.e., waste with less than 10 nanocuries per gram of transuranics) that is now stored on the transuranic waste pads would be transferred to the mixed waste storage pads. To accommodate future mixed waste storage needs prior to the availability of treatment facilities, DOE would build additional mixed waste storage buildings as needed. Based on the usable capacity of Building 643-43E, DOE estimates that a maximum of 79 additional buildings would be required by 2005 (Hess 1995c). See Section 2.4.5.1.1 for additional information. TC TE

DOE would manage low-level PCB wastes, radioactive oil, mercury-contaminated oil, and job-control waste contaminated with solvents and enriched uranium as described in alternative A (Section 2.4.5.1.1). TC

2.6.5.1.2 Treatment and/or Tank Storage

DOE would manage aqueous wastes in the Savannah River Technology Center tanks and the solvent tanks in E-Area, and aqueous liquids from groundwater monitoring wells as described in the no-action alternative (Section 2.2.5.2). TE

DOE would manage organic waste generated at the Defense Waste Processing Facility and wastes currently stored in the M-Area Process Waste Interim Treatment/Storage Facility tanks and M-Area storage building as described for alternative A (Section 2.4.5.1.2).

For alternative B – expected waste forecast, DOE would construct and operate a containment building for decontaminating approximately 23 percent of the mixed waste (glass, metal, organic, inorganic, and heterogeneous debris; bulk equipment) forecast. Decontaminated debris and equipment from which hazardous constituents were removed would be managed as low-activity equipment waste (see Section 2.6.3). Materials that could not be decontaminated would be macroencapsulated in welded stainless steel boxes or in a polymer coating and sent to RCRA-permitted disposal. Secondary wastes from the decontamination process would be collected for incineration at the Consolidated Incineration Facility. It is assumed that 80 percent of the materials could be decontaminated. DOE assumes that spent decontamination solutions would constitute 50 percent of the original volume of the materials to be decontaminated. The containment building would also provide macroencapsulation for lead wastes. The lead would be macroencapsulated in a polymer coating in accordance with RCRA treatment requirements (Hess 1994e, 1995c). See Appendix B.6 for a description of the containment building. TE TC TE TE

DOE would construct and operate a non-alpha vitrification facility to treat approximately 26 percent of the forecast mixed waste, including contaminated soil and organic and inorganic sludges. The vitrified TC waste would be sent to RCRA-permitted disposal or shallow land disposal. See Section 2.5.5.1.2 for additional information.

DOE would begin to operate the Consolidated Incineration Facility in 1996 for the treatment of approximately 20 percent of the mixed wastes anticipated under the expected forecast, including benzene waste generated by the Defense Waste Processing Facility, organic and aqueous liquid wastes, PUREX solvent, paint waste, radioactive oil, and heterogeneous, inorganic, and organic debris. Organic and inorganic sludges would be incinerated until 2006, when the non-alpha vitrification facility began to operate. The Consolidated Incineration Facility would also burn approximately 1,360 cubic meters (48,000 gallons) per year of spent decontamination solutions from the containment building. Stabilized ash and blowdown waste from the Consolidated Incineration Facility would be sent to RCRA-permitted disposal or shallow land disposal. See Section 2.4.5.1.2 for additional information.

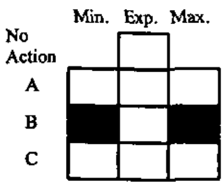
DOE would manage elemental mercury, mercury-contaminated waste, calcium metal waste, low-level PCB wastes, and lead as described for alternative A (Section 2.4.5.1.2).

2.6.5.1.3 Disposal

DOE submitted an application for RCRA permit to SCDHEC for 10 Hazardous Waste/Mixed Waste Disposal Vaults. For purposes of this EIS, DOE based its proposed disposal vaults on the design of its current Hazardous Waste/Mixed Waste Disposal Vault. See Section 2.2.5.3 for additional information.

As described in Section 2.2.5.3 for the no-action alternative, DOE would construct and operate RCRA-permitted vaults for disposal of mixed wastes. In addition, under the alternative B – expected waste forecast, DOE would manage hazardous waste in these vaults and would also use them to dispose of 70 percent of the stabilized ash and blowdown from the Consolidated Incineration Facility; 50 percent of the vitrified wastes from the non-alpha vitrification facility; elemental mercury waste from the Idaho National Engineering Laboratory; lead residuals from offsite decontamination; and macroencapsulated debris, bulk equipment, and lead from the containment building. The first of the RCRA-permitted disposal vaults would begin accepting wastes in 2002, and DOE would construct additional vaults as needed (Hess 1994e, 1995c). Refer to Section 2.6.7 for mixed waste disposal projections over the 30-year period.

Mixed wastes subject to RCRA because they exhibit a hazardous characteristic may be treated in a way that eliminates the characteristic (e.g., toxic metals may be immobilized). If mixed wastes are treated in this manner, they need not be disposed of at RCRA-permitted facilities, and DOE would dispose of them as low-level waste. DOE would send 30 percent of the stabilized ash and blowdown from the Consolidated Incineration Facility, 50 percent of the vitrified wastes from the non-alpha vitrification facility, stabilized residuals from the treatment of radioactive PCB wastes, calcium metal waste, and stabilized mercury waste from the Idaho National Engineering Laboratory to shallow land disposal (Hess 1994e, 1995c). Refer to Section 2.6.7 for projections of low-level waste disposal over the 30-year period. TC TE



2.6.5.2 Mixed Waste – Minimum and Maximum Waste Forecasts

For alternative B – minimum and maximum waste forecasts, DOE would change the way it manages some mixed waste. These changes from waste management practices described for the expected waste forecast are attributed to the volume of soils anticipated in the minimum (27 percent) and maximum (54 percent) forecasts, compared to the expected (39 percent) forecast. Figure 2-35 shows the proposed management activities for the minimum forecast. Smaller quantities of mixed waste soils and sludges would mean that construction of a non-alpha vitrification facility might not be necessary. DOE would modify the Consolidated Incineration Facility to accept these types of materials. TC TE

In the maximum forecast, because of the large volume of debris that would be decontaminated at the containment building, DOE would construct a wastewater treatment unit to treat spent decontamination solutions (see Appendix B.6 for a discussion of the wastewater treatment unit). TE

Limited quantities of liquid and solid residuals from the wastewater treatment unit (approximately 6 percent of the influent wastewater volume) would be burned at the Consolidated Incineration Facility. Table 2-35 describes the percentage of mixed waste distributed among the various treatment options under the minimum and maximum waste forecasts.

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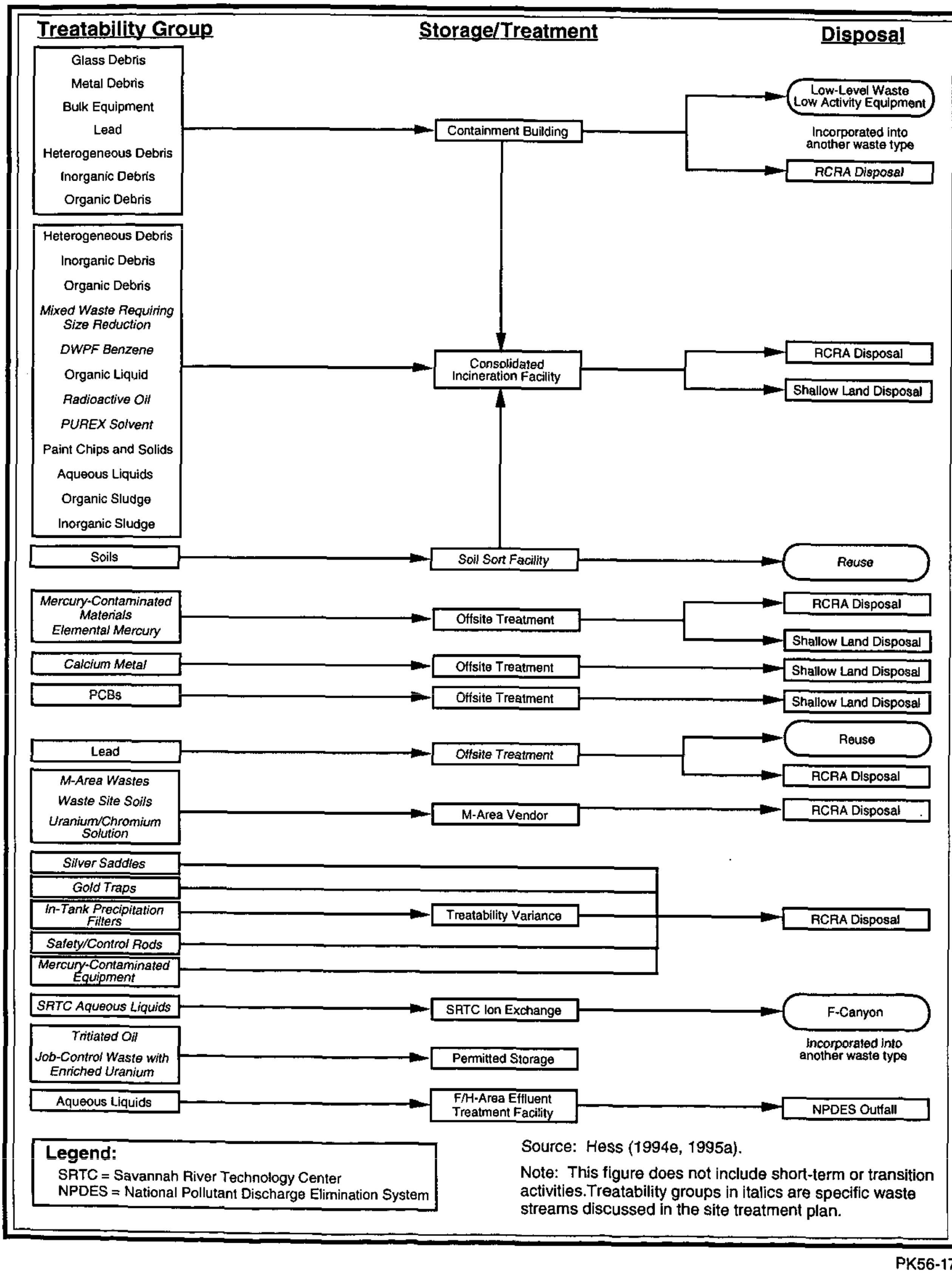


Figure 2-35. Mixed waste management plan for alternative B – minimum waste forecast.

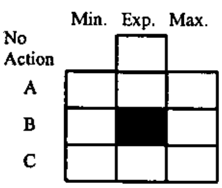
Table 2-35. Mixed waste treatment options for alternative B minimum and maximum waste forecasts.[a,b]

Minimum waste forecast	Maximum waste forecast
27 percent to soil sort facility	54 percent to soil sort facility
30 percent to containment building	23 percent to containment building
49 percent incinerated	14 percent incinerated

TC

a. Source: Hess (1995c). TE
b. Percentages are approximate.

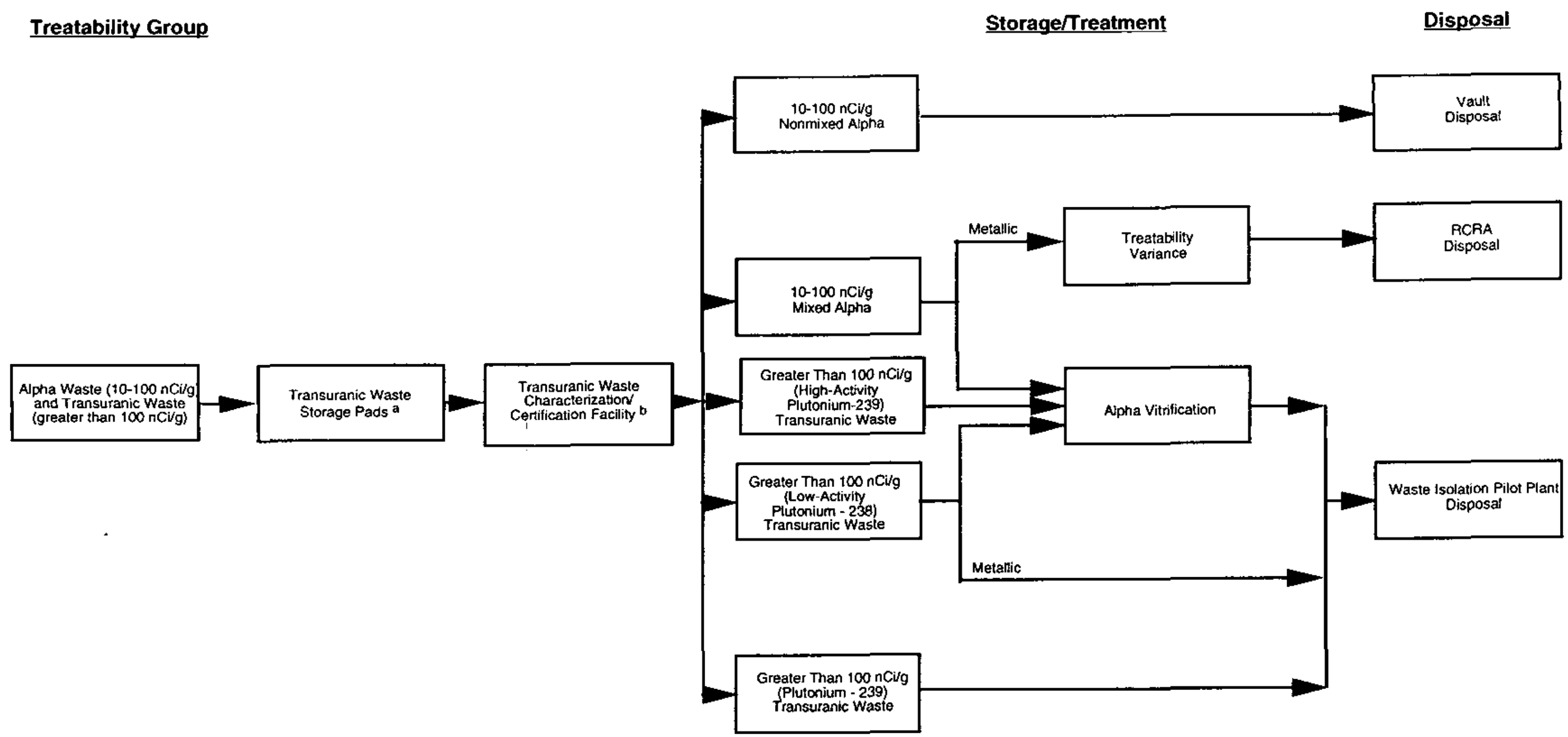
2.6.6 TRANSURANIC AND ALPHA WASTE



2.6.6.1 Transuranic and Alpha Waste – Expected Waste Forecast

For alternative B – expected waste forecast, DOE would provide moderate treatment that would allow disposal of alpha (10 to 100 nanocuries per gram) and transuranic (greater than 100 nanocuries per gram) wastes. Figure 2-36 summarizes the proposed alpha and transuranic waste management practices for alternative B, which include the waste management practices under the no-action alternative described in Section 2.2.6 and the following: TE

- Construct and operate the transuranic waste characterization/certification facility to characterize, treat, repackage, and certify waste for disposal.
- Construct and operate the alpha vitrification facility to vitrify mixed alpha waste (10 to 100 nanocuries per gram) and plutonium-238 waste (greater than 100 nanocuries per gram).
- Return Rocky Flats incinerator ash for consolidation and treatment with similar wastes at that facility. TC
- Dispose of nonmixed alpha waste in low-activity waste vaults and macroencapsulated mixed alpha waste metal debris at RCRA-permitted disposal vaults. TE
- Dispose of the vitrified and repackaged transuranic waste at the Waste Isolation Pilot Plant (Hess 1995a).



Legend:
nCi/g = Nanocuries per gram

[a] Alternate storage locations are being evaluated; this analysis is based on using transuranic waste storage pads only

[b] Waste certification activities consolidated with characterization/certification facility

Source: Hess (1994e).

PK56-17

Figure 2-36. Transuranic waste management plan for alternative B expected waste forecast.

TE

TE

2.6.6.1.1 Storage

For alternative B – expected waste forecast, DOE would continue to accumulate alpha and transuranic waste in the same manner as described under the no-action alternative (Section 2.2.6). In the draft EIS, DOE assumed that alpha wastes generated between 1995 and 2006 would be stored for processing at the transuranic waste characterization/certification facility. However, facilities would be available during that time period that could accept these wastes. DOE proposes to use these facilities to dispose of alpha wastes and reduce the need for additional storage capacity. Under alternative B, DOE would certify newly generated mixed and nonmixed alpha waste for disposal in the RCRA-permitted disposal vaults and low-activity waste vaults, respectively. DOE would package and store containers on transuranic waste storage pads to await processing; retrieve drums from mounded storage on Transuranic Waste Storage Pads 2 through 6; and construct new pads as needed. To meet RCRA storage requirements for storage of hazardous constituents and to accommodate newly generated transuranic waste, 10 additional transuranic waste storage pads (see Appendix B.30) would be required by 2006 (Hess 1994e, 1995c).

TC TE TE TC TE

For purposes of this EIS it is assumed that the Waste Isolation Pilot Plant would operate from 1998 to 2018 and would accept SRS transuranic waste. Transuranic waste processed by the transuranic waste characterization/certification facility after 2018 would remain in storage at SRS. DOE would require one transuranic waste storage pad to store the processed and packaged transuranic waste remaining in 2024 (Hess 1994e, 1995c). DOE has not determined how these wastes will be disposed of.

TC TE

2.6.6.1.2 Treatment

DOE would return a small amount (0.1 cubic meter) of Rocky Flats incinerator ash currently stored at SRS to that operations office for consolidation and treatment with similar wastes. The *SRS Proposed Site Treatment Plan* concluded that it was not cost effective to develop treatment at SRS for this small quantity of material. Rocky Flats is currently investigating alternatives for management of the ash.

TC

DOE would construct and operate the transuranic waste characterization/certification facility to perform assays and intrusive characterizations of the waste in drums, culverts, and boxes stored on transuranic waste storage pads. The facility would begin operating in 2007 and would process 94 percent of the alpha and transuranic waste. DOE would segregate waste into one of four categories: nonmixed alpha, mixed alpha, plutonium-238, or plutonium-239. After segregation, the mixed alpha waste and plutonium-238 transuranic waste would each be further divided into metallic and nonmetallic waste categories. Of the charactrized waste, the mixed alpha waste (14 percent overall) would contribute 11 percent nonmetallic and 3 percent metallic, respectively. The plutonium-238 waste (55 percent of the

TC TC

characterized waste) would contribute 33 percent nonmetallic and 22 percent metallic respectively to the overall total (Hess 1995a). The plutonium-239 waste would be further segregated into high- and low-activity categories. Bulk waste would be reduced in size to fit into 55-gallon drums. The transuranic waste characterization/certification facility would reduce the overall waste volume by 30 percent by processing and repackaging. Waste characterization would segregate the incoming waste categories so the alpha vitrification facility could properly blend the waste for vitrification to achieve a high-quality vitrified waste form. Further details on these topics are in the description of the transuranic waste characterization/certification facility in Appendix B.31.

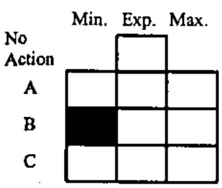
The nonmixed alpha and metallic plutonium-238 waste would be repackaged at the transuranic waste characterization/certification facility and certified for disposal. The nonmixed alpha waste would be disposed of in low-activity waste vaults. The metallic plutonium-238 waste and low-activity plutonium-239 waste would be packaged and certified for disposal at the Waste Isolation Pilot Plant in accordance with that facility's waste acceptance criteria. The metallic mixed alpha waste would be packaged into 55-gallon drums and macroencapsulated by welding the lid onto the drums. DOE recognizes that a portion of the metallic mixed alpha waste would not meet the definition of hazardous debris and would request a treatability variance from EPA to treat this waste by macroencapsulation. The metallic mixed alpha waste would be certified for onsite RCRA-permitted disposal. The nonmetallic mixed alpha waste and nonmetallic plutonium-238 waste would be packaged for vitrification in the alpha vitrification facility (Hess 1994e).

The alpha vitrification facility would begin operating in 2008. Only nonmetallic mixed alpha, nonmetallic plutonium-238, and high-activity plutounium-239 wastes would be vitrified (31 percent of the forecast volume). DOE would vitrify the mixed alpha waste because of the substantial volume reduction (95 percent) that would be achieved. The mixed alpha waste would be blended with the plutonium-238 and plutonium-293 wastes during vitrification and the vitrified waste form would be classified as transuranic waste. The vitrified waste produced by the alpha vitrification facility would be returned to the transuranic waste characterization/certification facility for certification and disposal at the Waste Isolation Pilot Plant (Hess 1994e, 1995c). A detailed description of the alpha vitrification facility is in Appendix B.1.

2.6.6.1.3 Disposal

A 58 percent reduction in transuranic and alpha waste volume would be realized under alternative B from repackaging and vitrification of the nonmetallic mixed alpha, nonmetallic plutonium-238, and high-activity plutonium-239 waste. Nonmixed alpha waste (38 percent of the processed volume) would

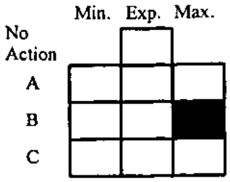
be disposed of in low-activity waste vaults and the macroencapsulated metallic mixed alpha waste
(11 percent of the processed volume) would be sent to RCRA-permitted disposal. Approximately half of TC
the waste (48 percent of the processed volume) would be shipped offsite for disposal as transuranic waste
(vitrified nonmetallic mixed alpha, nonmetallic plutonium-238, high-activity plutonium-239, and
repackaged low-activity plutonium-239 waste) at the Waste Isolation Pilot Plant starting in 2008 and
ending in 2018. DOE would ship 390 cubic meters (13,800 cubic feet) per year of transuranic waste to TC
the Waste Isolation Pilot Plant. By 2018, DOE would have shipped for disposal a quantity of transuranic
waste equal to approximately 3 percent of the total capacity of the Waste Isolation Pilot Plant TE
(Hess 1995c). Three percent of the processed waste volume would remain in storage at SRS on one TC
transuranic waste storage pad (Hess 1995c). TE



2.6.6.2 Transuranic and Alpha Waste – Minimum Waste Forecast

Because of the reduced volumes in the minimum waste forecast, DOE would make a minor change from
the expected waste forecast in the way it manages transuranic and alpha waste (Figure 2-35). With the
reconfiguration of the transuranic waste storage pads (see Appendix B.30) and newly generated waste, TE
two additional pads would be needed by 2005. By 2024, DOE would require only one transuranic waste TC
storage pad to store the remaining processed and packaged transuranic waste (Hess 1995c). TE

The characterization, treatment, and disposal methods would remain the same as in the expected waste
forecast; however, by 2018, DOE would have disposed of more transuranic waste (52 percent of the
processed volume) at the Waste Isolation Pilot Plant. Due to the accelerated treatment of transuranic
waste, only 1 percent of the processed volume would remain in storage on one transuranic waste storage TC
pad. DOE would ship 284 cubic meters (10,000 cubic feet) per year of transuranic waste to the Waste
Isolation Pilot Plant between 2008 and 2018. In 2018, DOE would have shipped for disposal a quantity
of transuranic waste equal to approximately 2 percent of the total capacity of the Waste Isolation Pilot
Plant (Hess 1995c). TE



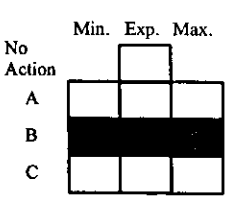
2.6.6.3 Transuranic and Alpha Waste – Maximum Waste Forecast

For alternative B – maximum waste forecast, DOE would manage transuranic and alpha waste somewhat
TE differently than in the expected forecast because of the dramatic change in the volume of transuranic
waste anticipated (25 times the expected waste forecast). DOE would also experience an increase in
mixed alpha waste (45 percent compared to 16 percent in the expected waste forecast) for processing and
TC disposal as a result of the assumptions made in the maximum forecast. By 2006, DOE would require
TE 1,168 additional transuranic waste storage pads to store newly generated waste (Hess 1995c).

TE For alternative B – maximum waste forecast, DOE would use the same treatment and disposal methods
as for the expected waste forecast; however, the waste characterization would differ (9 percent nonmixed
alpha, 47 percent mixed alpha, 35 percent plutonium-238, and 9 percent plutonium-239 waste). DOE
would send a slightly larger percentage of transuranic waste (50 percent of the processed volume) to the
TC Waste Isolation Pilot Plant. Less than 1 percent of the processed volume would remain in storage on one
transuranic waste storage pads at SRS (Hess 1995a, c).

TC DOE would ship 7,819 cubic meters (2.76×10^5 cubic feet) per year of transuranic waste to the Waste
Isolation Pilot Plant between 2008 and 2018. The waste volume disposed of in this forecast would
TC TE constitute 53 percent of the repository's total capacity (Hess 1995c).

2.6.7 SUMMARY OF ALTERNATIVE B FOR ALL WASTE TYPES



TE Under alternative B, DOE would continue the waste management activities at SRS listed for the no-action alternative (Section 2.2.7), including the construction of additional storage capacity for mixed wastes and transuranic and alpha wastes. Less capacity would be needed for this alternative than would be required for the no-action alternative. In addition, DOE would:

- Construct and operate a containment building to treat mixed waste.

- Construct and operate a non-alpha vitrification facility for mixed waste soils and sludges.

- Sort mixed waste soils at the non-alpha vitrification facility to separate uncontaminated soil for reuse.

- Operate a mobile low-level soil sort facility to separate uncontaminated soil for reuse and low-activity and suspect soils for disposal.

- Decontaminate and recycle low-activity equipment waste (metals) offsite. Treatment residues would be returned to SRS for shallow land disposal.

- Treat small quantities of mixed and PCB wastes offsite. Treatment residuals would be returned to SRS for disposal.

- Operate the Consolidated Incineration Facility for mixed (benzene generated by the Defense Waste Processing Facility, organic and aqueous liquid wastes, decontamination solutions from the containment building, PUREX solvent, radioactive oil, sludges, and debris), hazardous, and low-level wastes. TC

- Treat low-activity job-control and equipment wastes offsite; residuals would be returned to SRS for incineration at the Consolidated Incineration Facility or for disposal. TC

- Construct and operate a transuranic waste characterization/certification facility.

- Construct and operate an alpha vitrification facility.

- Dispose of transuranic wastes at the Waste Isolation Pilot Plant.

- Store tritiated oil to allow time for radioactive decay.

- Send elemental mercury and mercury-contaminated materials to the Idaho National Engineering Laboratory for treatment; residuals would be returned to SRS for RCRA-permitted disposal or shallow land disposal.

TE

- Send calcium metal waste to the Los Alamos National Laboratory for treatment; residuals would be returned to SRS for shallow land disposal.

- Send lead offsite for decontamination and recycling; treatment residuals would be returned for RCRA-permitted disposal at SRS.

- Construct disposal vaults for stabilized ash and blowdown from the incineration process (Hess 1995a).

TC

The largest impacts to land outside of E-Area would occur in the maximum waste forecast (approximately 756 acres for alternative B). This land would be required for storage facilities until treatment begins in approximately 2006. However, by 2024, most of the waste would have been treated and disposed of and no land would be required outside of E-Area for alternative B. It is highly unlikely that the technology used to store the waste volumes under the minimum and expected forecasts would be suitable for the maximum forecast. However, to compare the different treatment configurations among the alternatives of this EIS, the assumption was made that the same technology would be applied for all three waste forecasts. For example, DOE would likely construct the 10 additional transuranic waste storage pads required for the expected case; however, DOE would probably elect not to use the same technology if it called for 1,168 pads under the maximum forecast.

TE

Figure 2-37 shows a timeline for the ongoing and proposed waste management activities for alternative B. DOE would operate the existing waste management facilities until the proposed facilities could be designed, constructed, and begin operations. For all the waste types except high-level waste, the waste management activities that would occur from 1995 to 2007 are shown in Figure 2-38. Figure 2-39 shows the proposed waste management activities as they would occur after 2008.

TE

Table 2-36 shows the additional management facilities under alternative B and compares them to those required under the no-action alternative.

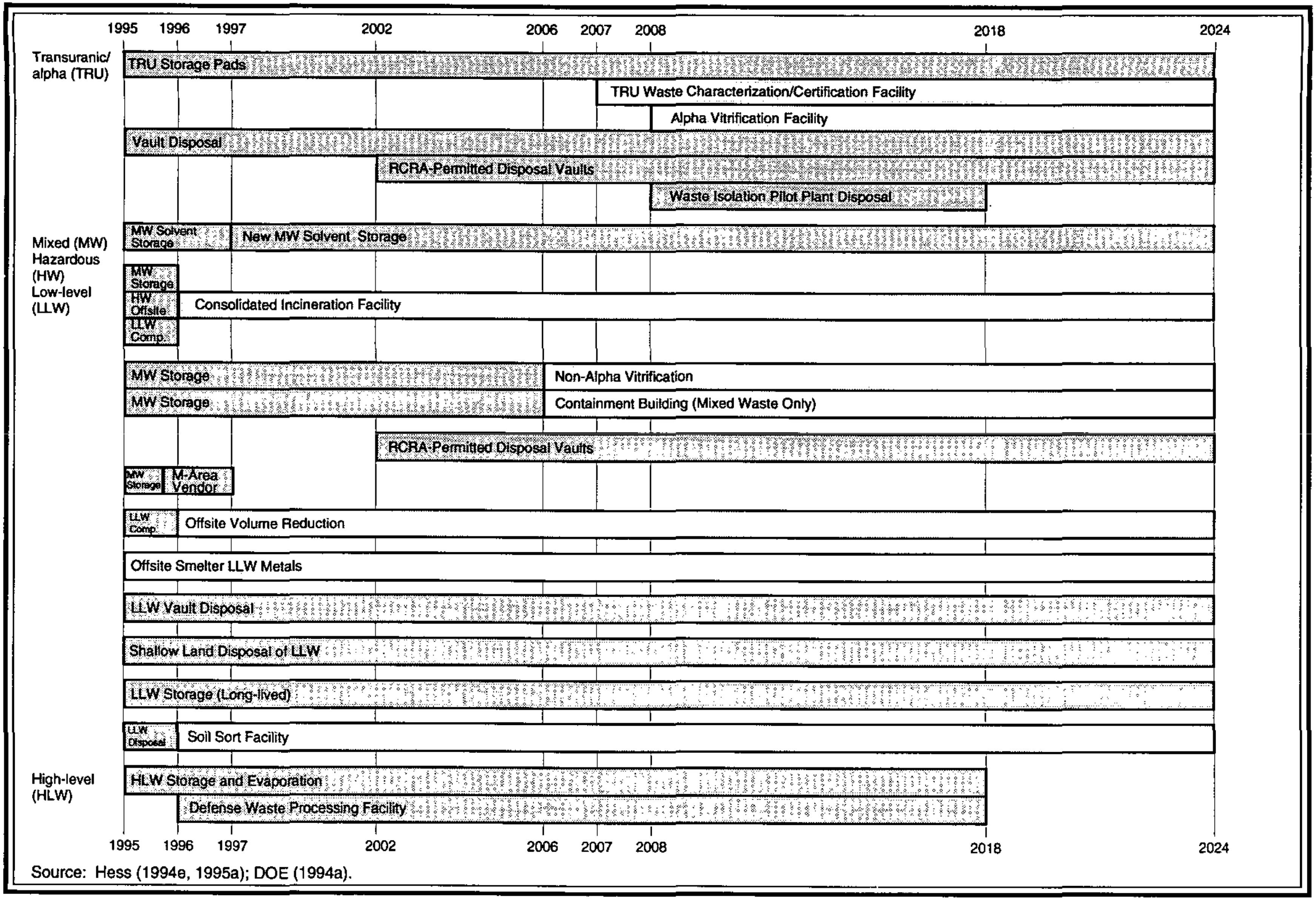


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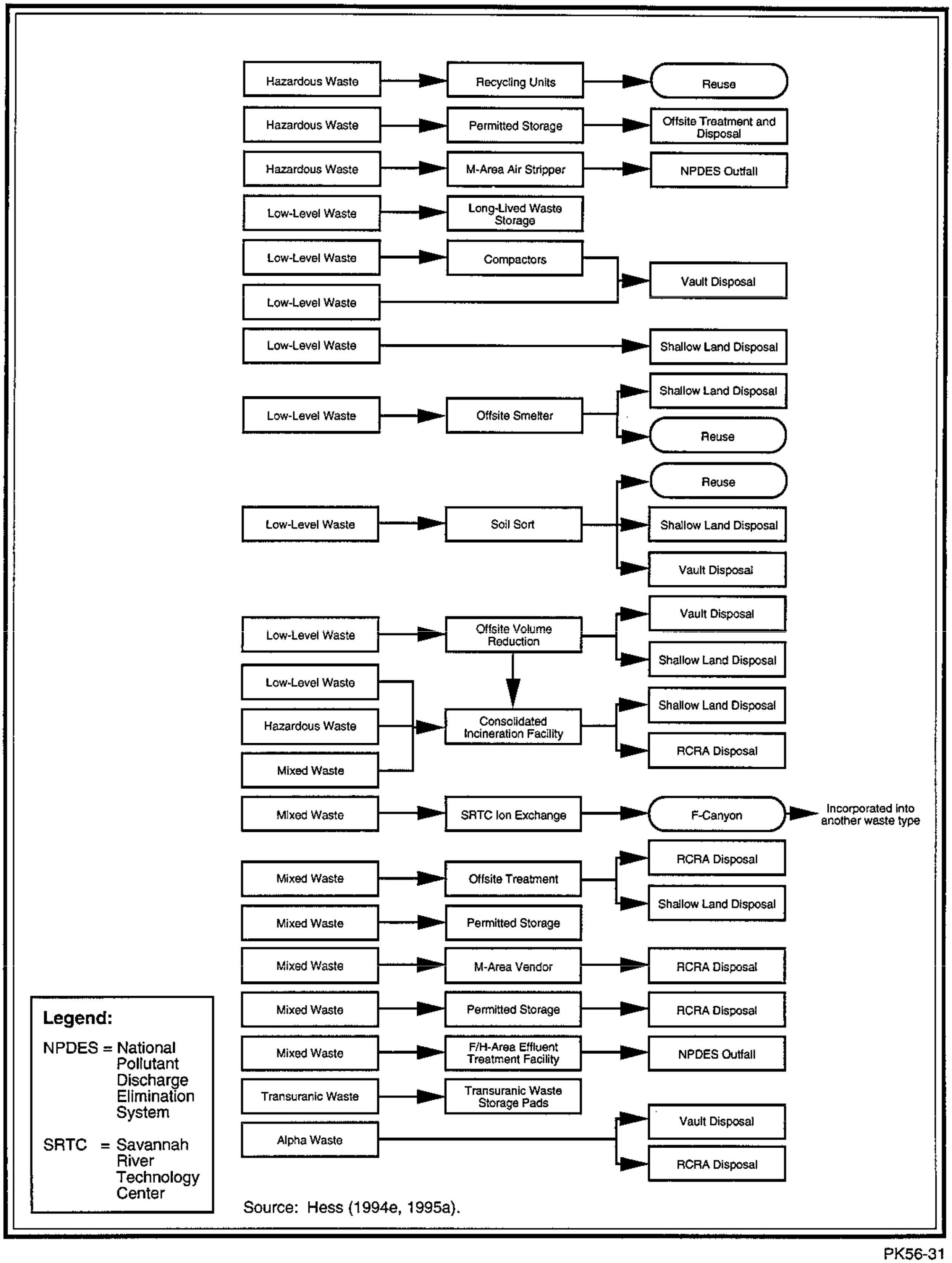
Figure 2-37. Timeline for waste management facilities in alternative B.



TC TE

TE **Figure 2-38.** Summary of waste management activities in alternative B until the year 2007.

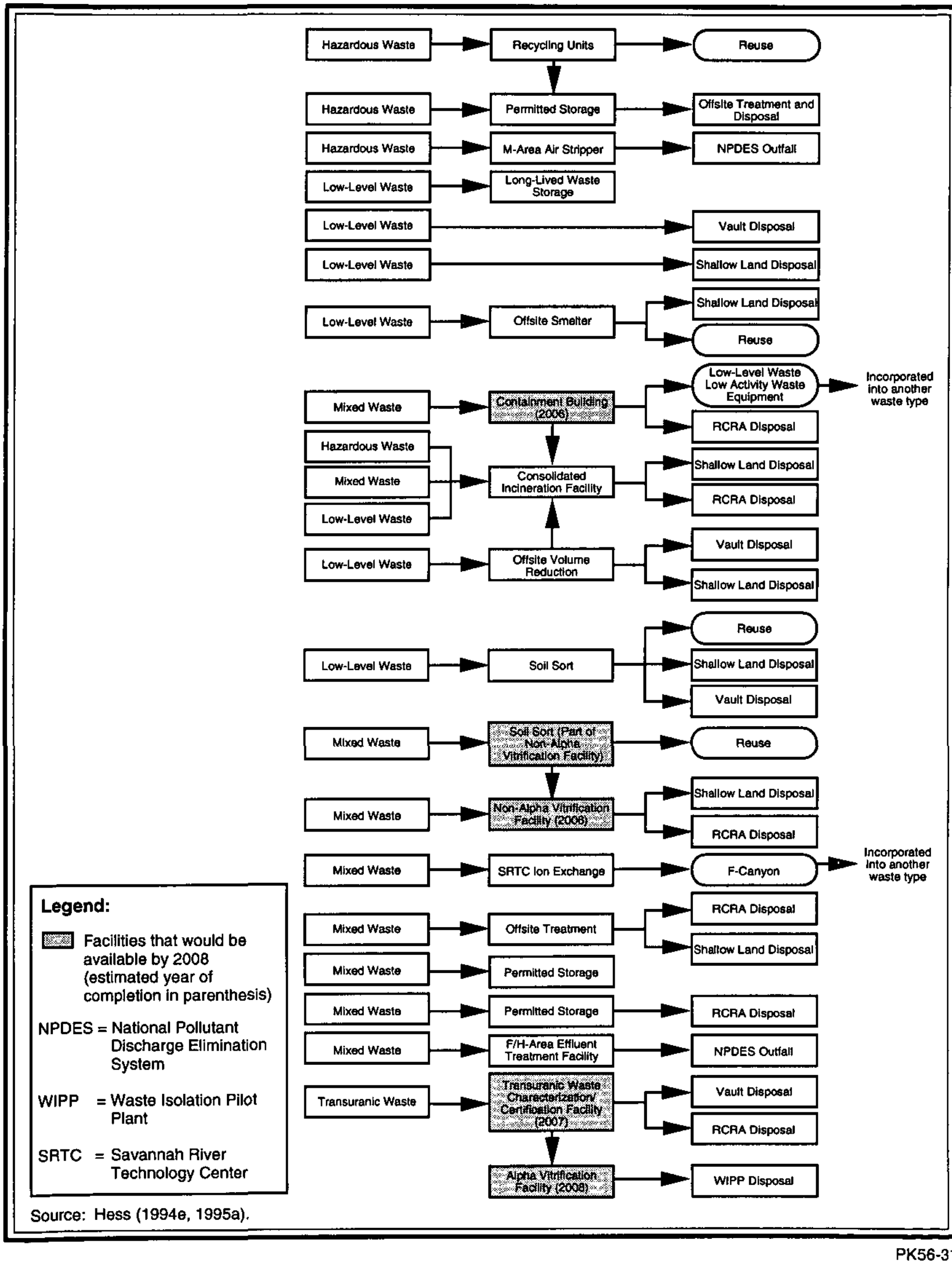


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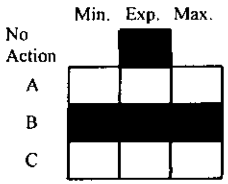
Figure 2-39. Summary of proposed waste management activities in alternative B after year 2008. TE



TC

Table 2-36. Comparison of treatment, storage, and disposal facilities under alternative B and the no-action alternative.

	Minimum	Expected	Maximum
No action		**STORAGE:** Buildings 24 long-lived low-level waste 291 mixed waste Pads 19 transuranic and alpha waste Tanks 4 organic waste in S-Area 26 organic waste in E-Area 43 aqueous waste in E-Area **TREATMENT:** Continue ongoing and planned waste treatment activities **DISPOSAL:** 29 shallow land disposal trenches 10 low-activity waste vaults 5 intermediate-level waste vaults 1 RCRA disposal facility	
B	**STORAGE:** Buildings 7 long-lived low-level waste 39 mixed waste Pads 2 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast, except no non-alpha vitrification facility; modify Consolidated Incineration Facility to accept mixed waste soils and sludges **DISPOSAL:** 37 shallow land disposal trenches 1 low-activity waste vault 2 intermediate-level waste vaults 20 RCRA disposal facilities	**STORAGE:** Buildings 24 long-lived low-level waste 79 mixed waste Pads 10 transuranic and alpha waste **TREATMENT:** Continue ongoing and planned waste treatment activities; treat limited quantities of mixed and PCB wastes offsite; begin volume reduction of low-activity job-control and equipment waste offsite; begin smelting low-activity equipment waste offsite; operate the Consolidated Incineration Facility for low-level, hazardous, and mixed wastes; construct and operate a low-level waste soil sort facility; construct and operate a mixed waste containment building; construct and operate a non-alpha vitrification facility for mixed waste soils and sludges; construct and operate a transuranic waste characterization/certification facility; construct and operate an alpha vitrification facility **DISPOSAL:** 58 shallow land disposal trenches 1 low-activity waste vault 5 intermediate-level waste vaults 21 RCRA disposal facilities	**STORAGE:** Buildings 34 long-lived low-level waste 652 mixed waste Pads 1,168 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast, except containment building modified to include wastewater treatment capability to treat spent decontamination solutions; treat its secondary waste at the Consolidated Incineration Facility **DISPOSAL:** 371 shallow land disposal trenches 8 low-activity waste vaults 9 intermediate-level waste vaults 96 RCRA disposal facilities

2.7 Comparison of Environmental Impacts

This EIS examines alternatives for managing several types of wastes at SRS: liquid high-level radioactive, low-level radioactive, hazardous, mixed, and transuranic. The impacts of those management alternatives are summarized in this section. TE

The EIS considered various configurations of volume reduction technologies for low-level radioactive wastes. These configurations included the continued compaction of low-level wastes in the no-action alternative and in alternative A; soil sorting and vitrification in alternative C; and soil sorting, supercompaction, size reduction, and incineration in alternative B. These configurations would result in the following volume reductions and disposal distributions for low-level wastes (Table 2-37): TC TE

Table 2-37. Volume reductions achieved for low-level waste.

Alternative A		Alternative B		Alternative C	
22	percent reduction in disposal volume	75	percent reduction in disposal volume	70	percent reduction in disposal volume
93	percent of waste volume disposed of in vaults	68	percent of waste volume disposed of in vaults	67	percent of waste volume disposed of in vaults
7	percent of waste volume sent to shallow land disposal	32	percent of waste volume sent to shallow land disposal	33	percent of waste volume sent to shallow land disposal

TC

Table 2-38 summarizes potential environmental impacts and costs of waste management activities, including the construction and operation of new facilities. For many parameters, existing environmental conditions would not change. Table 2-38 shows environmental impacts to various categories of resources. The evaluation of the environmental impacts of the alternatives considered in this EIS, which bound both the full range of reasonable waste management strategies and the quantities of waste that might be managed at SRS, indicates that many impacts are very small. Furthermore, the differences among management alternatives are minor for the same waste forecast. The major determinant of potential impacts is the amount of waste SRS would be required to manage. In other words, differences in waste volumes are more significant than differences in management strategies. The amount of waste SRS will manage depends in large part on the extent of environmental restoration and facility decontamination and decommissioning undertaken at SRS in the future. The receipt of wastes from other facilities and ongoing operations at SRS make much smaller contributions to waste volume. TE

In eight resource categories -- socioeconomics, groundwater, surface water, air, traffic, transportation, occupational health, and public health -- there would be very small impacts. Cleared and uncleared land would be disturbed by new facilities, which would impact ecological resources and future land-use options and could impact geologic and cultural resources. Specific impacts that would occur under each alternative include:

- Impacts and benefits of alternative ways to reduce the volume of low-level waste were evaluated. Under alternative A and the no-action alternative, low-level wastes would be compacted, resulting in a 22 percent reduction in the disposal volume. The size reduction (e.g., sorting, shredding, and melting), supercompaction, and incineration proposed in alternative B would reduce the volume by 75 percent, although with an increased (but still minor) impact on the health risks to remote populations. Soil sorting and vitrification proposed in alternative C would reduce the volume of low-level waste by 70 percent.

TC

- Construction and operation of facilities are required for each alternative. In general, waste treatment by facilities proposed for the alternative involving extensive treatment (alternative C) would produce higher operational impacts than those for the alternative involving limited treatment (alternative A) because more handling and processing of waste generally produces more emissions and greater worker exposure.

- Conversely, the limited treatment alternative (alternative A) would require more disposal capacity and disposal facilities with more sophisticated methods of containment (i.e., more vaults and less shallow land disposal), because alternative A would not reduce or immobilize wastes to the degree that alternative C (extensive treatment configuration) would.

- The moderate treatment alternative (alternative B) uses options from alternative A and alternative C, depending on the type of waste and its characteristics and physical properties, to balance the trade-offs between extensive treatment and extensive disposal. Variations in the implementation of alternative B would result in impacts that would fall somewhere between those from the less stable waste forms produced under alternative A and those from the greater operational emissions produced in alternative C. Impacts would be very small for each of the alternatives.

TE

- The no-action alternative would require more storage facilities at the end of the 30-year period of analysis than any other alternative. Under the no-action alternative, mixed and transuranic wastes would not have been treated or disposed of during the 30-year period considered in this EIS, increasing the risk of potential environmental impacts, including accidents and worker radiological exposure, above those of the other alternatives. Risks, treatments, and costs under the no-action alternative would be deferred, not avoided. In addition, some risk would be incurred during the 30-year storage period as a result of normal operations.

- Managing the maximum amount of waste in any of the alternatives would require clearing approximately 1,000 acres. It would be difficult to clear this much land in a heterogeneous landscape, such as occurs at SRS, without measurably affecting the ecological resources of the area. The loss of this much natural habitat would result in the loss of large numbers of individual animals. Although there are 181,000 acres (733 square kilometers) of forested land on SRS, committing 1,000 acres to waste management under the maximum waste forecast would more severely restrict future land-use options than would managing the minimum and expected waste forecasts, which would require less land. TE

- Groundwater impacts from shallow land and vault disposal would be very small. Exceedances of health-based standards that were identified in the draft EIS would not occur for two reasons. First, after the draft EIS was issued, DOE reevaluated the isotopic inventory of wastes and determined that curium-247 and -248 are not present at detectable concentrations in the wastes. Therefore, these radionuclides were removed from the waste inventories considered in the EIS groundwater analysis. Second, the draft EIS groundwater analysis did not account for the reduced mobility of the stabilized waste forms, such as ashcrete and glass, that might be placed in slit trenches. The analysis in this final EIS instead assumes that the performance of stabilized waste forms would conform with the performance objectives of DOE Order 5820.2A. TC

- Tritium releases to the Savannah River from groundwater beneath E-Area seeping into Upper Three Runs would reach their highest concentrations in 70 to 237 years. However, these concentrations would be very small and would remain well within drinking water standards under each alternative. TC

- Airborne emissions of nonradiological constituents would not increase appreciably over current emissions and would remain within applicable state and Federal standards for each alternative. Radiological emissions and resulting doses to the public and workers would remain within EPA standards. Over the 30-year evaluation period, these emissions would increase the risk of a fatal cancer to the maximally exposed member of the public by less than 2 in 100 million for the no-action alternative to about 6 in 100,000 under alternative C maximum waste forecast.

- Under each alternative, additional commuter traffic and truck shipments on SRS and nearby roads would not exceed the capacity of these roads.

- Risk of exposure to radiation from facility accidents to the population within 80 kilometers (50 miles) of SRS would be very small and similar under each alternative.

- TE Risk to workers at SRS and the public from exposure to toxic chemicals resulting from accidents would be very small and similar for each alternative. All workers follow stringent Occupational Safety and Health Administration requirements when handling toxic chemicals. Facilities where toxic chemicals are handled are some distance from the SRS boundaries, so the risk of exposure to the public is minimal.

- TC Projected facility cost and manpower requirements differ between the draft and final EIS. This is due to the following factors: a refinement of the parameters that determine operating manpower, building and equipment costs; a correction to the scope of the no-action alternative costs to make them consistent with the other alternative – waste forecast estimates; and new initiatives in alternative B that lowered facility costs for this alternative. In addition, the costing methodology bases construction manpower requirements on building and equipment costs; therefore, both operating and construction employment differ between draft and final EIS. This, in turn, affects projections of socioeconomic and traffic impacts. The cost analysis was changed to be consistent with the *Baseline Environmental Management Report* (DOE 1995) developed by DOE to ensure consistent reporting on estimating future facility construction and operation costs. This report is used to establish future budgetary requirements for the DOE complex.

- TC Costs for implementing each alternative were estimated for comparison purposes. Because detailed designs have not been developed for all facilities, these are only preliminary estimates of the likely costs. However, since they were developed for all alternatives from a consistent set of assumptions, they provide a reasonable basis for comparisons. As shown in Table 2-38, in terms of life-cycle costs, the implementation of the moderate treatment alternative for the minimum and expected waste forecast would be equal to implementation of the limited treatment alternative and more costly than the extensive treatment alternative. Implementation of the limited treatment alternative for the maximum waste forecast would be somewhat more costly than implementation of the moderate treatment alternative, which in turn would be more costly than the extensive TC treatment alternative.

Table 2-38 summarizes and compares the potential environmental impacts of the four waste management alternatives; these impacts result from land clearing and construction and operation of new facilities. The table focuses on the expected waste forecast, but it also presents the minimum and maximum waste TE forecasts when it is important for a full appreciation of the impacts.

Table 2-38. Comparison of the impacts of each alternative on environmental resources.

Additional treatment, storage, and disposal facilities for each alternative[a]			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		**STORAGE:** Buildings 24 long-lived low-level waste 291 mixed waste Pads 19 transuranic and alpha waste Tanks 4 organic waste in S-Area 26 organic waste in E-Area 43 aqueous waste in E-Area **TREATMENT:** Continue ongoing and planned waste treatment activities **DISPOSAL:** 29 shallow land disposal trenches 10 low-activity waste vaults 5 intermediate-level waste vaults 1 RCRA[b] disposal facility **COST[c]:** 6.9×10^9[d]	
A	**STORAGE:** Buildings 7 long-lived low-level waste 45 mixed waste Pads 3 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast **DISPOSAL:** 25 shallow land disposal trenches 9 low-activity waste vaults 2 intermediate-level waste vaults 21 RCRA disposal facilities **COST:** 4.2×10^9	**STORAGE:** Buildings 24 long-lived low-level waste 79 mixed waste Pads 12 transuranic and alpha waste **TREATMENT:** Continue ongoing and planned waste treatment activities; treat limited quantities of mixed and PCB waste offsite; operate the Consolidated Incineration Facility for hazardous and mixed waste, modify the facility to accept mixed waste soils and sludges; construct and operate a mixed waste containment building; construct and operate a mixed waste soil sort facility; construct and operate a transuranic waste characterization/certification facility **DISPOSAL:** 73 shallow land disposal trenches 12 low-activity waste vaults 5 intermediate-level waste vaults 61 RCRA disposal facilities **COST:** 6.9×10^9	**STORAGE:** Buildings 34 long-lived low-level waste 757 mixed waste Pads 1,168 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast except containment building modified to include wastewater treatment capability to treat spent decontamination solutions; treat its secondary waste at the Consolidated Incineration Facility **DISPOSAL:** 644 shallow land disposal trenches 31 low-activity waste vaults 31 intermediate-level waste vaults 347 RCRA disposal facilities **COST:** 24×10^9

TC

Table 2-38. (continued).

Alternative	Waste forecast		
	Additional treatment, storage, and disposal facilities for each alternative (continued)		
	Minimum	Expected	Maximum
TC B	**STORAGE:** Buildings 7 long-lived low-level waste 39 mixed waste Pads 2 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast, except no non-alpha waste vitrification facility; modify Consolidated Incineration Facility to accept mixed waste soils and sludges **DISPOSAL:** 37 shallow land disposal trenches 1 low-activity waste vault 2 intermediate-level waste vault 20 RCRA disposal facilities **COST:** $\$4.2 \times 10^9$	**STORAGE:** Buildings 24 long-lived low-level waste 79 mixed waste Pads 10 transuranic and alpha waste **TREATMENT:** Continue ongoing and planned waste treatment activities; treat limited quantities of mixed and PCB wastes offsite; begin volume reduction of low-activity job-control and equipment waste offsite; begin smelting low-activity equipment waste offsite; operate the Consolidated Incineration Facility for low-level, hazardous, and mixed wastes; construct and operate a low-level waste soil sort facility; construct and operate a mixed waste containment building; construct and operate a non-alpha vitrification facility for mixed waste soils and sludges; construct and operate a transuranic waste characterization/certification facility; construct and operate an alpha vitrification facility **DISPOSAL:** 58 shallow land disposal trenches 1 low-activity waste vaults 5 intermediate-level waste vault 21 RCRA disposal facilities **COST:** $\$6.9 \times 10^9$	**STORAGE:** Buildings 34 long-lived low-level waste 652 mixed waste Pads 1,168 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast, except containment building modified to include wastewater treatment capability to treat spent decontamination solutions; treat its secondary waste at the Consolidated Incineration Facility **DISPOSAL:** 371 shallow land disposal trenches 8 low-activity waste vaults 9 intermediate-level waste vaults 96 RCRA disposal facilities **COST:** $\$20 \times 10^9$

Table 2-38. (continued).

Additional treatment, storage, and disposal facilities for each alternative (continued)			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
C	**STORAGE:** Buildings 7 long-lived low-level waste 39 mixed waste Pads 2 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast **DISPOSAL:** 45 shallow land disposal trenches 2 low-activity waste vaults 1 intermediate-level waste vault 10 RCRA disposal facilities **COST:** $\$3.8 \times 10^9$	**STORAGE:** Buildings 24 long-lived low-level waste 79 mixed waste Pads 11 transuranic and alpha waste **TREATMENT:** Continue ongoing and planned waste treatment activities; treat limited quantities of mixed and PCB wastes offsite; begin smelting low-activity equipment waste offsite; operate the Consolidated Incineration Facility for low-level, hazardous, and mixed waste until vitrification facility is available; construct and operate a hazardous and mixed waste containment building; construct and operate a non-alpha vitrification facility for low-level, hazardous, and mixed waste; construct and operate a transuranic waste characterization/certification facility; construct and operate an alpha vitrification facility **DISPOSAL:** 123 shallow land disposal trenches 2 low-activity waste vaults 2 intermediate-level waste vaults 40 RCRA disposal facilities **COST:** $\$5.6 \times 10^9$	**STORAGE:** Buildings 34 long-lived low-level waste 652 mixed waste Pads 1,166 transuranic and alpha waste **TREATMENT:** Same as expected waste forecast **DISPOSAL:** 576 shallow land disposal trenches 5 low-activity waste vaults 3 intermediate-level waste vaults 111 RCRA disposal facilities **COST:** $\$18 \times 10^9$

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a. Facilities identified are in addition to those currently constructed; activities are in addition to ongoing or planned activities.
b. Resource Conservation and Recovery Act.
c. Life-cycle costs are expressed as present worth in 1994 dollars with 3 percent escalation and 6 percent discount rate (refer to Appendix C for details).
d. Source: Cost for no-action (Hess 1995e); cost for other alternatives (Hess 1995f).

Table 2-38. (continued).

Geologic Resources			
The impacts to the geologic resources of SRS can be evaluated by examining the amount of land that would be cleared to build facilities. The following amounts of developed and undeveloped land areas could experience erosion. Except for the maximum waste forecast, all clearing would take place in E-Area. Under the maximum waste forecast, the need for land exceeds that available in E-Area. The potential for erosion and sedimentation increases as the amount of land needed for construction increases, especially for previously uncleared land. Acreage shown is the largest cumulative amount of land needed for construction activities at any time during the 30-year period.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		Developed: 81 acres Undeveloped: 160 acres	
A	Developed: 41 acres Undeveloped: 73 acres	Developed: 65 acres Undeveloped: 96 acres	Developed: 70 acres Undeveloped: 184 acres (within E-Area) 802 acres (developed/undeveloped outside E-Area)
B	Developed: 25 acres Undeveloped: 90 acres	Developed: 51 acres Undeveloped: 117 acres	Developed: 70 acres Undeveloped: 184 acres (within E-Area) 756 acres (developed/undeveloped outside E-Area)
C	Developed: 32 acres Undeveloped: 111 acres	Developed: 59 acres Undeveloped: 128 acres	Developed: 70 acres Undeveloped: 184 acres (within E-Area) 775 acres (developed/undeveloped outside E-Area)

TC

Table 2-38. (continued).

Groundwater Resources			
The impacts to the groundwater resources at SRS from implementing the alternative waste management scenarios were evaluated by examining the drinking water doses from a hypothetical well 100 meters away. Under all alternatives the total impact to groundwater resources would result in a dose not greater than 4 millirem per year. The values below represent the impacts resulting from low-level waste vaults (both low-activity and intermediate-level vaults) and from suspect soil disposal in slit trenches.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		Plutonium-239 peak dose 0.33 millirem per year. Less than one-tenth the 4 millirem per year drinking water standard. No impact.	
A	Plutonium-239 peak dose 0.24 millirem per year. Six hundredth (0.06) of the 4 millirem per year drinking water standard. No impact.	Same as no action.	Plutonium-239 peak dose 0.79 millirem per year. Less than one-fifth the 4 millirem per year drinking water standard. No impact.
B	Plutonium-239 peak dose 0.23 millirem per year. Less than six hundredth (0.06) of the 4 millirem per year drinking water standard. No impact.	Same as no action.	Plutonium-239 peak dose 0.43 millirem per year. Slightly over one-tenth the 4 millirem per year drinking water standard. No impact.
C	Plutonium-239 peak dose 0.15 millirem per year. Less than four hundredth (0.04) of the 4 millirem per year drinking water standard. No impact.	Plutonium-239 peak dose 0.21 millirem per year. Less than six hundredth (0.06) of the 4 millirem per year drinking water standard. No impact.	Plutonium-239 peak dose 0.25 millirem per year. Six hundredth (0.06) of the 4 millirem per year drinking water standard. No impact.

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Table 2-38. (continued).

Surface Water			
The impacts to surface water resources can be evaluated by examining the potential effects on people and the environment from both radiological and nonradiological constituents present in treated wastewater.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		Construction: Potential erosion impacts to SRS streams would be very small. Operations: Tritium would peak in Savannah River in 70 to 237 years. Other radionuclides would peak in more than 1,000 years. Radionuclide concentrations are very small.	
A	Construction: Potential erosion impacts less than alternative A expected waste forecast. Operations: Same as alternative A expected waste forecast.	Construction: Same as no-action alternative. Operations: Same as no-action alternative.	Construction: Potential erosion impacts greater than alternative A expected waste forecast. Operations: Same as alternative A expected waste forecast.
B	Construction: Potential erosion impacts less than alternative B expected waste forecast. Operations: Same as alternative B expected waste forecast.	Construction: Same as no-action alternative. Operations: Same as no-action alternative.	Construction: Potential erosion impacts greater than alternative B expected waste forecast. Operations: Same as alternative B expected waste forecast.
C	Construction: Potential erosion impacts less than alternative C expected waste forecast. Operations: Same as alternative C expected waste forecast.	Construction: Same as no-action alternative Operations: Same as no-action alternative.	Construction: Potential erosion impacts greater than alternative C expected waste forecast. Operations: Same as alternative C expected waste forecast.

TC

Table 2-38. (continued).

Air Resources			
The impacts to the air in the vicinity of SRS can be evaluated by examining the emissions from construction activities and operating facilities.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 1,919 micrograms per cubic meter. Operations: Radiological: MEI[a] dose would be 1.2×10^{-4} millirem/year and population dose would be 2.9×10^{-4} person-rem/year. Nonradiological: Criteria increments are very small. Largest increase would be carbon monoxide (1-hour standard) at 24 micrograms per cubic meter.	
A	Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 394 micrograms per cubic meter. Operations: Radiological: MEI dose would be 0.0057 millirem/year and population dose would be 0.27 person-rem/year. Nonradiological: Same as alternative A expected waste forecast.	Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 769 micrograms per cubic meter. Operations: Radiological: MEI dose would be 0.011 millirem/year and population dose would be 0.56 person-rem/year. Nonradiological: Same as no-action alternative.	Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 7,751 micrograms per cubic meter. Operations: Radiological: MEI dose would be 0.080 millirem/year and population dose would be 3.4 person-rem/year. Nonradiological: Same as alternative A expected waste forecast.
B	Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 323 micrograms per cubic meter. Operations: Radiological: MEI dose would be 0.02 millirem/year and population dose would be 0.98 person-rem/year. Nonradiological: Same as alternative B expected waste forecast.	Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 673 micrograms per cubic meter. Operations: Radiological: MEI dose would be 0.032 millirem/year and population dose would be 1.5 person-rem/year. Nonradiological: Criteria increments would be very small. Largest incremental increase would be carbon monoxide (1-hour standard) at 31 micrograms per cubic meter. Air toxic increments would be very small.	Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 6,645 micrograms per cubic meter. Operations: Radiological: MEI dose would be 0.33 millirem/year and population dose would be 14 person-rem/year. Nonradiological: Same as alternative B expected waste forecast.

TC

Table 2-38. (continued).

Air Resources (continued)			
The impacts to the air in the vicinity of SRS can be evaluated by examining the emissions from construction activities and operating facilities.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
TC C	Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 330 micrograms per cubic meter. Operations: Radiological: MEI dose would be 0.09 millirem/year and population dose would be 4.9 person-rem/year. Nonradiological: Same as alternative C expected waste forecast.	Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 737 micrograms per cubic meter. Operations: Radiological: MEI dose would be 0.18 millirem/year and population dose would be 10 person-rem/year. Nonradiological: Same as no-action alternative.	Construction: Largest increase over baseline would be carbon monoxide (1-hour standard) at 6,793 micrograms per cubic meter. Operations: Radiological: MEI dose would be 4.0 millirem/year and population dose would be 229 person-rem/year. Nonradiological: Same as alternative C expected waste forecast.

a. MEI = offsite maximally exposed individual.

Table 2-38. (continued).

Ecological Resources			
The impact to the ecological resources of SRS can be evaluated by examining the amount of land that would be cleared. The more land required for the facilities, the more wildlife habitat destroyed. Indirect impacts to nearby streams (such as siltation and increased water temperatures) also increase with increasing acreage. The following amounts of undeveloped woodland would be cleared for each alternative.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		160 acres	
A	73 acres	96 acres	986 acres
B	90 acres	117 acres	940 acres
C	111 acres	128 acres	959 acres

TC

Table 2-38. (continued).

Land Use

Land-use impacts were evaluated on the basis of the amount of land that would be cleared to build facilities, that would otherwise be available for nonindustrial uses such as natural resource conservation, research, or other as yet undetermined uses. For the minimum and expected waste forecasts in all alternatives, using cleared acreage would not impact current land-use plans. For the maximum waste forecasts in all alternatives, land-use plans for areas outside of E-Area would potentially be impacted because uncleared land would be required. Acreage shown is the largest amount of land needed (developed and undeveloped) for waste management facilities at any one time.

Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		241 acres in E-Area; no impact to current land-use plans.	
A	108 acres in E-Area	152 acres in E-Area	254 acres in E-Area and 802 acres elsewhere on SRS. Potential impacts to land-use plans outside of E-Area.
B	107 acres in E-Area	158 acres in E-Area	254 acres in E-Area and 756 acres elsewhere on SRS. Potential impacts to land-use plans outside of E-Area.
C	141 acres in E-Area	167 acres in E-Area	254 acres in E-Area and 775 acres elsewhere on SRS. Potential impacts to land-use plans outside of E-Area.

TC

Table 2-38. (continued).

Cultural Resources			
Potential impacts to cultural resources can be evaluated by identifying the known or expected significant resources in the areas of potential impact and activities that could directly or indirectly affect those significant resources. Potential impacts would vary by alternative relative to the amount of land that would be disturbed for construction and operation of waste management facilities. Acreage shown is the amount of land needed for construction activities over the 30-year period.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		Disturbance of approximately 241 acres[a]	
A	Disturbance of approximately 114 acres	Disturbance of approximately 161 acres	Disturbance of approximately 1,056 acres
B	Disturbance of approximately 115 acres	Disturbance of approximately 168 acres	Disturbance of approximately 1,010 acres
C	Disturbance of approximately 143 acres	Disturbance of approximately 187 acres	Disturbance of approximately 1,029 acres

TC

a. In all forecasts, some additional surveying would be required. Potential indirect impacts to significant archaeological resources northwest of F-Area would vary by alternative relative to the amount of land to be disturbed. Potential impacts would be mitigated as appropriate.

Table 2-38. (continued).

Socioeconomics			
Impacts to socioeconomic resources can be evaluated by examining the potential effects from the construction and operation of waste management facilities on factors such as employment, income, population, and community resources.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		Construction: Peak of 50 jobs; no net change in regional construction employment; no impact. Operations: Peak of 2,450 jobs; filled through the reassignment of existing workers; no impact.	
A	Construction: Peak of 70 jobs; no net change in regional construction employment; no impact. Operations: Peak of 1,680 jobs; filled through the reassignment of existing workers; no impact.	Construction: Peak of 80 jobs; no net change in regional construction employment; no impact. Operations: Peak of 2,560 jobs; filled through the reassignment of existing workers; no impact.	Construction: Peak of 260 jobs; no net change in regional construction employment; no impact. Operations: Peak of 11,200 jobs; 3,300 new jobs; 3% increase in regional employment; less than 3% increase in regional population; 4% increase in regional income.
B	Construction: Peak of 120 jobs; no net change in regional construction employment; no impact. Operations: Peak of 1,600 jobs; filled through the reassignment of existing workers; no impact.	Construction: Peak of 170 jobs; no net change in regional construction employment; no impact. Operations: Peak of 2,550 jobs; filled through the reassignment of existing workers; no impact.	Construction: Peak of 330 jobs; no net change in regional construction employment; no impact. Operations: Peak of 10,010 jobs; 2,110 new jobs; 2% increase in regional employment; less than 2% increase in population; less than 3% increase in regional income.
C	Construction: Peak of 130 jobs; no net change in regional construction employment; no impact. Operations: Peak of 1,470 jobs; filled through the reassignment of existing workers; no impact.	Construction: Peak of 160 jobs; no net change in regional construction employment; no impact. Operations: Peak of 1,940 jobs; filled through the reassignment of existing workers; no impact.	Construction: Peak of 350 jobs; no net change in regional construction employment; no impact. Operations: Peak of 10,060 jobs; 2,160 new jobs; 2% increase in regional employment; less than 2% increase in regional population; less than 3% increase in regional income.

TC

Table 2-38. (continued).

Traffic			
Traffic impacts are expressed as the increase in vehicles per hour and hazardous and radioactive waste shipments (by truck) per day.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		Construction: 788 vehicles[a] per hour, an increase of 47 per day from baseline estimates. Trucks: 815 shipments[b] per day (no change from baseline).	
A	Construction: 809 vehicles per hour Trucks: 802 shipments per day	Construction: 824 vehicles per hour Trucks: 817 shipments per day	Construction: 999 vehicles per hour Trucks: 873 shipments per day
B	Construction: 856 vehicles per hour Trucks: 804 shipments per day	Construction: 907 vehicles per hour Trucks: 819 shipments per day	Construction: 1,068 vehicles per hour Trucks: 872 shipments per day
C	Construction: 873 vehicles per hour Trucks: 801 shipments per day	Construction: 896 vehicles per hour Trucks: 814 shipments per day	Construction: 1,089 vehicles per hour Trucks: 858 shipments per day

TC

a. Vehicles are presented as vehicles arriving at E-Area during the peak traffic hour. Additional construction worker vehicles are assumed to all arrive during the peak hour.
b. Truck traffic for this table includes trucks not involved in waste management activities (785 per day) (Swygert 1994) and radioactive and hazardous waste shipments. Details on truck traffic are provided in Section 3.11.2.1 of this EIS.

Table 2-38. (continued).

Alternative	Minimum	Expected	Maximum
	Transportation - Incident-free		
	TE Transportation impacts can be evaluated by comparing additional latent cancer fatalities that might result from transport of waste.		
	Waste forecast		
No action		Involved workers: 0.06 additional excess fatal cancer per year could develop. Uninvolved workers: 8.4×10^{-4} additional excess fatal cancer per year could develop.[a]	
A	Involved workers: 0.057 additional excess fatal cancer per year could develop. Uninvolved workers: 4.2×10^{-4} additional excess fatal cancer per year could develop. Remote population: 5.4×10^{-7} additional excess fatal cancer per year could develop.[b]	Involved workers: 0.12 additional excess fatal cancer per year could develop. Uninvolved workers: 8.8×10^{-4} additional excess fatal cancer per year could develop. Remote population: 1.2×10^{-6} additional excess fatal cancer per year could develop.	Involved workers: 0.3 additional excess fatal cancer per year could develop. Uninvolved workers: 0.0014 additional excess fatal cancer per year could develop. Remote population: 3.2×10^{-6} additional excess fatal cancer per year could develop.
B	Involved workers: 0.05 additional excess fatal cancer per year could develop. Uninvolved workers: 4.4×10^{-4} additional excess fatal cancer per year could develop. Remote population: 0.0026 additional excess fatal cancer per year could develop.	Involved workers: 0.098 additional excess fatal cancer per year could develop. Uninvolved workers: 8.9×10^{-4} additional excess fatal cancer per year could develop. Remote population: 0.0032 additional excess fatal cancer per year could develop.	Involved workers: 0.22 additional excess fatal cancer per year could develop. Uninvolved workers: 0.0013 additional excess fatal cancer per year could develop. Remote population: 0.0038 additional excess fatal cancer per year could develop.
C	Involved workers: 0.041 additional excess fatal cancer per year could develop. Uninvolved workers: 4.1×10^{-4} additional excess fatal cancer per year could develop. Remote population: 1.5×10^{-4} additional excess fatal cancer per year could develop.	Involved workers: 0. 079 additional excess fatal cancer per year could develop. Uninvolved workers: 8.6×10^{-4} additional excess fatal cancer per year could develop. Remote population: 2.7×10^{-4} additional excess fatal cancer per year could develop.	Involved workers: 0.15 additional excess fatal cancer per year could develop. Uninvolved workers: 0.0013 additional excess fatal cancer per year could develop. Remote population: 7.2×10^{-4} additional excess fatal cancer per year could develop.

TC

a. Remote population would not be affected because there are very few offsite shipments under the no-action alternative.
b. Remote population = members of the public along transportation routes that would be exposed to normal shipments and accidents.

Table 2-38. (continued).

Transportation - Accidents

Dose (person-rem), probability, and risk determine additional latent cancer fatalities from transportation accidents. Transportation impacts can be compared by evaluating additional latent cancer fatalities that might result from transport of waste. | TE

Alternative	Waste forecast: Minimum				Expected				Maximum			
	Receptor	LCF	Probability	Risk	Receptor	LCF[a]	Probability[b]	Risk[c]	Receptor	LCF	Probability	Risk
No action[d]					Uninvolved workers[e]	124	2.6×10^{-6}	3.2×10^{-4}				
					Offsite Pop[e]	14	2.6×10^{-6}	3.5×10^{-5}				
A	Receptor	LCF	Probability	Risk	Receptor	LCF	Probability	Risk	Receptor	LCF	Probability	Risk
	Uninvolved workers	124	1.8×10^{-6}	2.2×10^{-4}	Uninvolved workers	124	2.6×10^{-6}	3.2×10^{-4}	Uninvolved workers	124	4.2×10^{-5}	0.0052
	Offsite Pop	14	1.8×10^{-6}	2.4×10^{-5}	Offsite Pop	14	2.6×10^{-6}	3.5×10^{-5}	Offsite Pop	14	4.2×10^{-5}	5.8×10^{-4}
	Remote Pop	2.4×10^{-6}	4.6×10^{-4}	1.1×10^{-9}	Remote Pop	2.4×10^{-6}	0.0011	2.5×10^{-9}	Remote Pop	2.4×10^{-6}	0.0027	6.5×10^{-9}
B	Receptor	LCF	Probability	Risk	Receptor	LCF	Probability	Risk	Receptor	LCF	Probability	Risk
	Uninvolved workers	124	1.8×10^{-6}	2.2×10^{-4}	Uninvolved workers	124	2.6×10^{-6}	3.2×10^{-4}	Uninvolved workers	124	4.2×10^{-5}	0.0052
	Offsite Pop	14	1.8×10^{-6}	2.4×10^{-5}	Offsite Pop	14	2.6×10^{-6}	3.5×10^{-5}	Offsite Pop	14	4.2×10^{-5}	5.8×10^{-4}
	Remote Pop	0.18	1.2×10^{-6}	2.2×10^{-7}	Remote Pop	0.18	1.6×10^{-6}	2.9×10^{-7}	Remote Pop	0.18	1.6×10^{-6}	2.9×10^{-7}
C	Receptor	LCF	Probability	Risk	Receptor	LCF	Probability	Risk	Receptor	LCF	Probability	Risk
	Uninvolved workers	124	1.8×10^{-6}	2.2×10^{-4}	Uninvolved workers	124	2.6×10^{-6}	3.2×10^{-4}	Uninvolved workers	124	4.2×10^{-5}	0.0052
	Offsite Pop	14	1.8×10^{-6}	2.4×10^{-5}	Offsite Pop	14	2.6×10^{-6}	3.5×10^{-5}	Offsite Pop	14	4.2×10^{-5}	5.8×10^{-4}
	Remote Pop	2.4×10^{-6}	4.6×10^{-4}	1.1×10^{-9}	Remote Pop	2.4×10^{-6}	0.0011	2.5×10^{-9}	Remote Pop	2.4×10^{-6}	0.0027	6.5×10^{-9}

TC

a. Latent cancer fatalities per accident.
b. Annual over 30-year period.
c. Annual risk of latent cancer fatalities.
d. There are very few offsite radioactive waste shipments under the no-action alternative.
e. DOE has adopted a dose-to-risk conversion factor of 0.0004 latent cancer fatalities per person-rem for uninvolved workers and 0.0005 latent cancer fatalities person-rem for the offsite population. The latter factor is slightly higher because of the presence of groups of people like infants or children who may be more susceptible to radiation than workers.

Table 2-38. (continued).

Occupational Health			
TE | *The principal potential human health effect from exposure to low doses of radiation is cancer.* Human health effects from exposure to chemicals may be both toxic effects (e.g., nervous system disorders) and cancer. For the purpose of the analysis, radiological carcinogenic effects are expressed as the annual number of fatal cancers for population estimates and probability of death of the maximally exposed individual. Nonradiological carcinogenic effects are expressed as the number of nonfatal cancers.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		**Radiological** Involved worker[a] (probability of fatal cancer): 1.0×10^{-5} (Involved worker in 1993 baseline[b] was 2.0×10^{-5}) All involved workers[c] (probability of fatal cancer): 0.021 (Value for all involved workers in 1993 baseline was 3.3) **Nonradiological**: Very small impacts[d]	
A	**Radiological** Involved worker[a] (probability of fatal cancer): 1.3×10^{-5} All involved workers[c] (number of lifetime cancers): 0.027 **Nonradiological**: Very small impacts	**Radiological** Involved worker[a] (probability of fatal cancer): 1.3×10^{-5} All involved workers[c] (number of lifetime cancers): 0.028 **Nonradiological**: Very small impacts	**Radiological** Involved worker[a] (probability of fatal cancer): 1.9×10^{-5} All involved workers[c] (number of lifetime cancers): 0.046 **Nonradiological**: Very small impacts
B	**Radiological** Involved worker[a] (probability of fatal cancer): 1.4×10^{-5} All involved workers[c] (number of lifetime cancars): 0.030 **Nonradiological**: Very small impacts	**Radiological** Involved worker[a] (probability of fatal cancer): 1.5×10^{-5} All involved workers[c] (number of lifetime cancers): 0.032 **Nonradiological**: Very small impacts	**Radiological** Involved worker[a] (probability of fatal cancer): 2.3×10^{-5} All involved workers[c] (number of lifetime cancers): 0.058 **Nonradiological**: Very small impacts
C	**Radiological** Involved worker[a] (probability of fatal cancer): 1.5×10^{-5} All involved workers[c] (number of lifetime cancers): 0.033 **Nonradiological**: Very small impacts	**Radiological** Involved worker[a] (probability of fatal cancer): 1.6×10^{-5} All involved workers[c] (number of lifetime cancers): 0.034 **Nonradiological**: Very small impacts	**Radiological** Involved worker[a] (probability of fatal cancer): 2.4×10^{-5} All involved workers[c] (number of lifetime cancers): 0.060 **Nonradiological**: Very small impacts

TC

a. Value for the involved worker represents the annual probability of the maximally exposed worker contracting a fatal cancer in his or her lifetime due to 30 years of radiation exposure from waste management activities.

b. Baseline values include all workers at SRS (for 30 years of exposure).

c. Value for all involved workers represents the annual number of lifetime fatal cancers expected in the waste management worker population due to 30 years of radiation exposure from waste management activities.

d. Employee exposure would be below Occupational Safety and Health Administration - permissible exposure limits and health impacts would be expected to be very small.

Table 2-38. (continued).

Public Health			
The principal potential human health effect from exposure to low doses of radiation is cancer. Human health effects from exposure to chemicals may be both toxic effects (e.g., nervous system disorders) and cancer. For the purpose of the analysis, radiological carcinogenic effects are expressed as the annual number of fatal cancers for population estimates and probability of death of the maximally exposed individual. Nonradiological carcinogenic effects are expressed as the probability of excess latent cancers over a 70-year lifetime.			
Alternative	Waste forecast		
	Minimum	Expected	Maximum
No action		**Radiological** Offsite MEI[a,b] (probability of fatal cancer): 4.1×10^{-10} (Offsite MEI in 1993 baseline[c] was 3.9×10^{-7}) Offsite Population[d] (number of fatal cancers): 3.5×10^{-6} (Offsite population in 1993 baseline was 0.11) **Nonradiological[e]** Probability of latent fatal cancers: 2.0×10^{-7}	
A	**Radiological** Offsite MEI (probability of fatal cancer): 3.2×10^{-9} Offsite Population (number of fatal cancers): 1.4×10^{-4} **Nonradiological** Probability of latent fatal cancers: 1.9×10^{-7}	**Radiological** Offsite MEI (probability of fatal cancer): 5.8×10^{-9} Offsite Population (number of fatal cancers): 2.8×10^{-4} **Nonradiological** Probability of latent fatal cancers: 2.0×10^{-7}	**Radiological** Offsite MEI (probability of fatal cancer): 4.1×10^{-8} Offsite Population (number of fatal cancers): 0.0017 **Nonradiological** Probability of latent fatal cancers: 2.0×10^{-7}
B	**Radiological** Offsite MEI (probability of fatal cancer): 1.2×10^{-8} Offsite Population (number of fatal cancers): 5.2×10^{-4} **Nonradiological** Probability of latent fatal cancers: 1.9×10^{-7}	**Radiological** Offsite MEI (probability of fatal cancer): 1.8×10^{-8} Offsite Population (number of fatal cancers): 8.0×10^{-4} **Nonradiological** Probability of latent fatal cancers: 2.0×10^{-7}	**Radiological** Offsite MEI (probability of fatal cancer): 1.8×10^{-7} Offsite Population (number of fatal cancers): 0.008 **Nonradiological** Probability of latent fatal cancers: 2.0×10^{-7}

TC

TC

Table 2-38. (continued).

Public Health (continued)

TC The principal potential human health effect from exposure to low doses of radiation is cancer. Human health effects from exposure to chemicals may be both toxic effects (e.g., nervous system disorders) and cancer. For the purpose of the analysis, radiological carcinogenic effects are expressed as the annual number of fatal cancers for population estimates and probability of death of the maximally exposed individual. Nonradiological carcinogenic effects are expressed as the probability of excess latent cancers over a 70-year lifetime.

Alternative	Waste forecast: Minimum	Waste forecast: Expected	Waste forecast: Maximum
TC C	**Radiological** Offsite MEI (probability of fatal cancer): 4.6×10^{-8} Offsite Population (number of fatal cancers): 0.0025 **Nonradiological** Probability of latent fatal cancers: 2.1×10^{-7}	**Radiological** Offsite MEI (probability of fatal cancer): 9.0×10^{-8} Offsite Population (number of fatal cancers): 0.0050 **Nonradiological** Probability of latent fatal cancers: 2.2×10^{-7}	**Radiological** Offsite MEI (probability of fatal cancer): 2.0×10^{-6} Offsite Population (number of fatal cancers): 0.11 **Nonradiological** Probability of latent fatal cancers: 2.7×10^{-7}

a. MEI = maximally exposed individual.
b. Value for the MEI represents the annual probability of the offsite maximally exposed individual contracting a fatal cancer in his or her lifetime due to 30 years of radiation exposure from waste management activities.
c. Baseline values include impacts from all activities at SRS.
d. Value for offsite population represents the annual number of lifetime fatal cancers expected in the exposed population due to 30 years of radiation exposure from waste management activities.
e. Annual latent cancer probability adjusted for 30 years of waste management activities.

Table 2-38. (continued).

Accidents

The impacts to workers and the public from postulated radioactive accidents at SRS considered in the alternatives can be evaluated and compared by the increase in potential latent fatal cancers per year. The estimated latent fatal cancers per year are based on dose, dose-to-health effects conversion factor, and probability of an accident occurring. For hazardous chemical releases, impacts are assumed when threshold values of concentrations in air that could cause short-term effects to workers or the public are exceeded. The long-term health consequences of human exposure to hazardous chemicals are not as well understood, and thus more subjective, than those for radiation.

Alternative	Waste forecast: Minimum	Waste forecast: Expected	Waste forecast: Maximum
No action		LCF[a] / Frequency / Risk[b] CW100[c]: 0.052 / 0.02 / 0.001 CW640[c]: 9.2×10^{-4} / 0.02 / 1.8×10^{-5} MEI[c]: 1.7×10^{-5} / 0.02 / 3.3×10^{-7} OFFP[c]: 0.84 / 0.02 / 0.017 No chemical accidents exceed threshold for life-threatening health effects for maximally exposed individual; 7 release scenarios exceed this threshold for CW100; 1 release scenario exceeds this threshold for CW640.	
A	The accident scenario[d] providing the greatest impacts to the uninvolved workers at 100 and 640 meters, the maximally exposed offsite individual, and the population within 80 kilometers would require three fewer intermediate-level waste vaults than the expected waste forecast. DOE believes that the probability of this accident would be less than for the expected waste forecast. Chemical accident impacts would be the same as for the expected waste forecast.	LCF / Frequency / Risk CW100[c]: 0.052 / 0.02 / 0.001 CW640[c]: 9.2×10^{-4} / 0.02 / 1.8×10^{-5} MEI[c]: 1.7×10^{-5} / 0.02 / 3.3×10^{-7} OFFP[c]: 0.84 / 0.02 / 0.017 Chemical accident impacts would be the same as for the no-action alternative.	The accident scenario[d] providing the greatest impacts to the uninvolved workers at 100 and 640 meters, the maximally exposed offsite individual, and the population within 80 kilometers would require 26 more intermediate-level waste vaults than the expected waste forecast. DOE believes that the probability of this accident would be higher than for the expected waste forecast. Chemical accident impacts would be the same as for the expected waste forecast.
B	The accident scenario[d] providing the greatest impacts to the uninvolved workers at 100 and 640 meters, the maximally exposed offsite individual, and the population within 80 kilometers would require three fewer intermediate-level waste vaults than the expected waste forecast. DOE believes that the probability of this accident would be less than for the expected waste forecast. Chemical accident impacts would be the same as for the expected waste forecast.	LCF / Frequency / Risk CW100[c]: 0.052 / 0.02 / 0.001 CW640[c]: 9.2×10^{-4} / 0.02 / 1.8×10^{-5} MEI[c]: 1.7×10^{-5} / 0.02 / 3.3×10^{-7} OFFP[c]: 0.84 / 0.02 / 0.017 Chemical accident impacts would be the same as for the no-action alternative.	The accident scenario[d] providing the greatest impacts to the uninvolved workers at 100 and 640 meters, the maximally exposed offsite individual, and the population within 80 kilometers would require four more intermediate-level waste vaults than the expected waste forecast. DOE believes that the probability of this accident would be higher than for the expected waste forecast. Chemical accident impacts would be the same as for the expected waste forecast.

TE

Table 2-38. (continued).

Accidents (continued)

The impacts to workers and the public from postulated radioactive accidents at SRS considered in the alternatives can be evaluated and compared by the increase in potential latent fatal cancers per year. The estimated latent fatal cancers per year are based on dose, dose-to-health effects conversion factor, and probability of an accident occurring. For hazardous chemical releases, impacts are assumed when threshold values of concentrations in air that could cause short-term effects to workers or the public are exceeded. The long-term health consequences of human exposure to hazardous chemicals are not as well understood, thus more subjective, than those for radiation.

	Alternative	Waste forecast: Minimum	Waste forecast: Expected	Waste forecast: Maximum
TE	C	The accident scenario[d] providing the greatest impacts to the uninvolved workers at 100 and 640 meters, the maximally exposed offsite individual, and the population within 80 kilometers would require one fewer intermediate-level waste vaults than the expected waste forecast. *DOE believes that the probability of this* accident would be less than for the expected waste forecast.	LCF / Frequency / Risk[a] CW100[c]: 0.052 / 0.02 / 0.001 CW640[c]: 9.2×10^{-4} / 0.02 / 1.8×10^{-5} MEI[c]: 1.7×10^{-5} / 0.02 / 3.3×10^{-7} OFFP[c]: 0.84 / 0.02 / 0.017	The accident scenario[d] providing the greatest impacts to the uninvolved workers at 100 and 640 meters, and the maximally exposed offsite individual, and the population within 80 kilometers would require one more intermediate-level waste vaults than the expected waste forecast. *DOE believes that the probability of this* accident would be higher than for the expected waste forecast.
		Chemical accident impacts would be the same as for the expected waste forecast.	Chemical accident impacts would be the same as for the no-action alternative.	Chemical accident impacts would be the same as for the expected waste forecast.

a. Latent cancer fatalities per accident.

b. Point estimates of increased risk of latent cancer fatalities per year.

c. The impact for each receptor group is from the representative bounding accident with the greatest overall estimated risk of increased fatal cancers per year for all waste types considered.

d. This accident scenario is a container breach at the Intermediate-Level Non-Tritium Vault (see Appendix F, Section F.5.2.2.1).

CW100 = Uninvolved worker at 100 meters (328 feet) (in millirem).
CW640 = Uninvolved worker at 640 meters (2,100 feet) (in millirem).
MEI = Offsite maximally exposed individual (in millirem).
OFFP = Offsite population to 80 kilometers (50 miles) (in person-rem).

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