1.0 Introduction

This *Hanford Site Solid*[a] *(Radioactive and Hazardous) Waste Program Environmental Impact Statement* (HSW EIS) provides environmental and technical information concerning U.S. Department of Energy (DOE) ongoing and proposed waste management practices at the Hanford Site in Washington State. The HSW EIS updates some analyses of environmental consequences from previous documents and provides evaluations for activities that may be implemented consistent with the Waste Management Programmatic Environmental Impact Statement (WM PEIS; DOE 1997c) Records of Decision (RODs). The draft HSW EIS was initially issued in April 2002 for public comment (DOE 2002b). A revised draft HSW EIS was issued in March 2003 to address new waste management alternatives that had been proposed since the initial draft HSW EIS was prepared, and to address comments received during the public review period for the first draft (DOE 2003d). The revised draft HSW EIS also incorporated alternatives for disposal of immobilized low-activity waste (ILAW) from treatment of Hanford Site tank waste in the waste treatment plant (WTP) currently under construction, an activity that was not included in the first draft (68 FR 7110).

This final HSW EIS describes the DOE preferred alternative, and in response to public comments received on the March 2003 revised draft, provides additional analyses for some environmental consequences associated with the preferred alternative, with other alternatives, and with cumulative impacts.[b] Public comments on the revised draft HSW EIS are addressed in the comment response document (Volume III of this final EIS).

This HSW EIS describes the environmental consequences of alternatives for constructing, modifying, and operating facilities to store, treat, and/or dispose of low-level (radioactive) waste (LLW), transuranic (TRU) waste, ILAW, and mixed low-level waste (MLLW) including WTP melters at Hanford. In addition, the potential long-term consequences of LLW, MLLW, and ILAW disposal on groundwater and surface water are evaluated for a 10,000-year period, although the DOE performance standards only require assessment for the first 1000 years after disposal (DOE 2001f). This document does not address non-radioactive waste that contains "hazardous" or "dangerous" waste, as defined under the Resource Conservation and Recovery Act (RCRA) of 1976 (42 USC 6901) and Washington State Dangerous Waste regulations (WAC 173-303). Following a previous National Environmental Policy Act (NEPA, 42 USC 4321) review (DOE 1997d), DOE decided to dispose of TRU waste in New Mexico at the Waste Isolation Pilot Plant (WIPP), a repository that meets the requirements of 40 CFR 191 (63 FR 3623). This HSW EIS has been prepared in accordance with NEPA, the DOE implementing procedures for NEPA

(a) The term "solid waste" is used to denote that the focus of this EIS is upon radioactive waste in solid form rather than liquid waste. It is not synonymous with the usage of the term "solid waste" in the Resource Conservation and Recovery Act (RCRA).

(b) The final HSW EIS is based on the revised draft HSW EIS. Substantive changes (additions, deletions, and modifications) to the document are indicated with "change bars" in the margins of the affected pages. These change bars indicate additional or revised information since the publication of the revised draft HSW EIS, including information based on revised analyses, and in response to public comments. Changes that were editorial in nature are not indicated.

(10 CFR 1021), and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508).

1.1 Organization of the HSW EIS

The organization and content of this HSW EIS are described briefly as follows:

- **Volume I –** Consists of the main document that describes the background, alternatives, affected environment, environmental consequences, regulatory framework, and other related sections, as follows:

  - **Section 1 – Introduction**: Provides an introduction, organization of the EIS, a statement of the purpose and need for DOE action and description of the proposed action, an overview of Hanford Site cleanup operations including solid radioactive and mixed waste management activities, a discussion of related DOE programs and documents including Hanford's accelerated cleanup performance management plan, NEPA documents related to the HSW EIS, and the NEPA process for developing and finalizing the HSW EIS.

  - **Section 2 – HSW EIS Waste Streams and Waste Management Facilities**: Describes Hanford waste management operations, waste types, waste streams, existing facilities, and facilities related to the proposed action and alternatives.

  - **Section 3 – Description and Comparison of Alternatives**: Describes alternative actions that could be taken at Hanford to manage solid radioactive and mixed waste (waste that contains both radioactive and hazardous constituents), including alternative management strategies for each waste type, and the No Action Alternative. This section also provides a comparison of environmental impacts among the alternatives.

  - **Section 4 – Affected Environment**: Discusses the human and physical environment that might be affected by radioactive and mixed waste management operations at Hanford.

  - **Section 5 – Environmental Consequences**: Identifies the potential impacts on the human and physical environment that might result from implementation of the alternatives for waste management at Hanford. This section also addresses environmental justice, cumulative impacts, irreversible and irretrievable commitment of resources, the relationship between short-term uses of the environment and the maintenance or enhancement of long-term productivity, and potential mitigation measures.

  - **Section 6 – Regulatory Framework**: Identifies regulations and permits that apply to radioactive and mixed waste management operations at Hanford.

  - **Section 7 – List of Preparers and Contributors**: Identifies key persons who contributed to the preparation of the HSW EIS.

- **Index –** Provides an alphabetized list of key names, terms, and subjects in this EIS and the sections in which each item is mentioned.

- **Volume II Appendixes –** Provides additional information regarding specific sections of the EIS and discusses key issues identified during the scoping process for the HSW EIS.

- **Volume III Comment Response Document –** explains DOE's role in the cleanup process at Hanford; discusses key issues raised during the public comment process for the revised draft HSW EIS, including changes incorporated into this final HSW EIS in response to comments. Comments from federal agencies; state, local, and tribal governments; public and private organizations; and individuals are summarized, and DOE responses to those comments are provided.

- **Volume IV Submitted Comment Documents and Transcripts** – contains copies of comment letters and other comments submitted in writing, as well as transcripts of public meetings, for the revised draft HSW EIS.

1.2 Purpose and Need and Proposed Action

DOE needs to provide capabilities to continue, or modify, the way it treats, stores, and/or disposes of existing and anticipated quantities of solid LLW, MLLW, TRU waste, and ILAW at the Hanford Site in order to protect human health and the environment; facilitate cleanup at Hanford and other DOE facilities; take actions consistent with decisions reached by DOE under the WM PEIS; comply with local, state, and federal laws and regulations; and meet other obligations such as the Hanford Federal Facility Agreement and Consent Order (also referred to as the Tri-Party Agreement, or TPA) (Ecology et al. 1989).

To address anticipated needs for waste management capabilities, DOE proposes to do the following:

- continue to operate and modernize existing treatment, storage, and disposal facilities for LLW and MLLW, and treatment and storage facilities for TRU waste
- construct additional disposal capacity for LLW
- develop capabilities to treat MLLW for disposal at Hanford
- construct additional disposal capacity for MLLW
- construct disposal capacity for ILAW and WTP melters[(a)]
- close onsite disposal facilities and provide for post-closure stewardship of disposal sites
- develop additional capabilities to certify TRU waste for disposal at WIPP.

(a) On July 3, 2003, parts of DOE Order 435.1 dealing with the procedures for determining waste incidental to reprocessing were declared invalid by the U.S. District Court for the District of Idaho in **Natural Resources Defense Council v. DOE**, No. 01-413-S-BLW. The District Court's ruling is currently on appeal to the U.S. Court of Appeals for the Ninth Circuit. The ultimate outcome of this matter, and its impact or applicability to wastes addressed in this EIS, are uncertain. While this EIS evaluates the disposal, at Hanford, of ILAW and melter wastes meeting Hanford Site Solid Waste Acceptance Criteria, DOE would only proceed with disposal of these wastes if their disposal complies with applicable law.

Alternatives proposed to accomplish the purpose and need are described in Section 3. The No Action Alternative is also evaluated as required by NEPA. For purposes of analysis in this HSW EIS, the No Action Alternative is defined as continuing ongoing activities, or as implementing previous NEPA decisions where those activities have not commenced.

1.3 Overview of Hanford Site Operations and DOE Waste Management Activities

The Hanford Site occupies approximately 1517 km^2 (586 mi^2), principally in Benton and Franklin counties of south-central Washington State (Figure 1.1). The Columbia River flows through the northern and eastern parts of the site, which extends about 46 km (25 mi) north from Richland, Washington. DOE and its predecessors, the Manhattan Project, the U.S. Atomic Energy Commission (AEC), and the U.S. Energy Research and Development Administration (ERDA), have operated the Hanford Site since the 1940s. From the beginning through the 1980s, the primary mission at Hanford was to produce nuclear materials in support of United States defense, research, and biomedical programs. Operations associated with those programs used facilities for fabrication of nuclear reactor fuel, reactors for nuclear materials production, chemical separation plants, nuclear material processing facilities, research laboratories, and waste management facilities. Plutonium production at Hanford has ceased, and DOE activities at the site currently include research, environmental restoration, and waste management. Additional historical information regarding the Hanford Site is available on the Internet at http://www.hanford.gov.

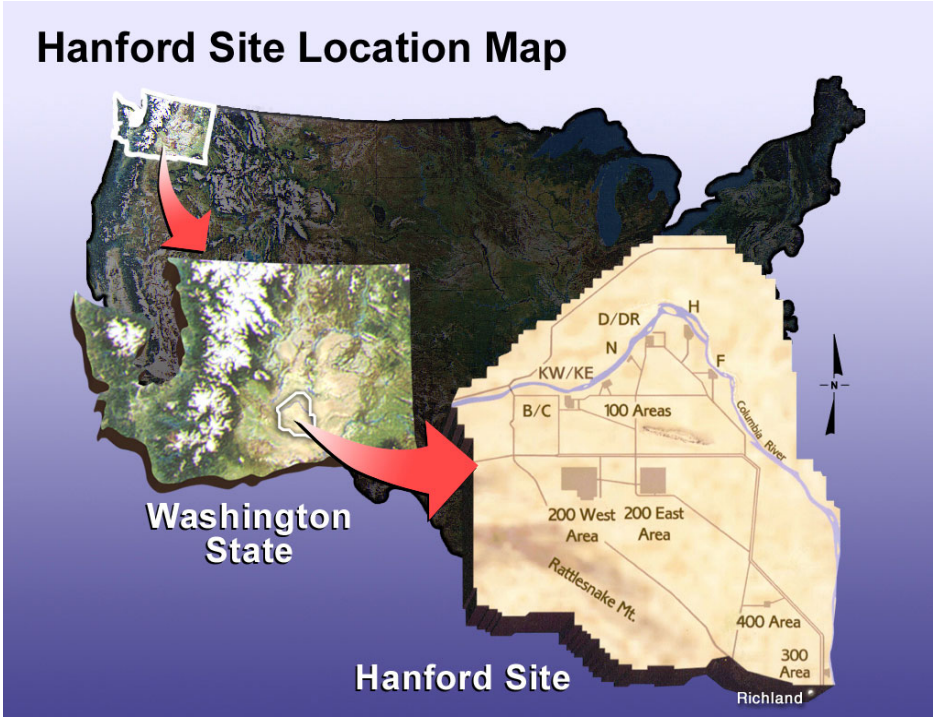

Figure 1.1. Hanford Site Location Map

In addition to the DOE activities at Hanford, there are several facilities operated by other agencies at the site. The Laser Interferometer Gravitational Wave Observatory (LIGO) is an advanced scientific observatory for measuring gravity waves at extremely low levels. The project involves the California Institute of Technology, the Massachusetts Institute of Technology, and the National Science Foundation. The Hanford Site was selected for the LIGO because of its available space and seismic stability. A commercial nuclear power plant, the Columbia Generating Station, also operates within the Hanford Site. That facility is located on property leased to Energy Northwest, a consortium of regional public utilities.

The largest non-DOE federal agency at Hanford is the U.S. Fish and Wildlife Service, which co-manages with DOE the 195,000-acre Hanford Reach National Monument, which was established by presidential proclamation on June 9, 2000. The monument includes the Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE), Saddle Mountain Wildlife Refuge, Wahluke Slope, White Bluffs, the sand dune area northwest of the Energy Northwest Site, historic structures (including homesteads from small towns established along the riverbanks in the early 20th century), and land 0.4 km (¼ mi) inland on the south and west shores of the 82-km (51-mi) long Hanford Reach, the last free-flowing, non-tidal stretch of the Columbia River. Also included were the McGee Ranch and Riverlands area and the federally owned islands within that portion of the Columbia River.

US Ecology, Inc. operates a commercial low-level radioactive waste disposal facility on 40.5 hectares (100 acres) of the Hanford Site near the 200 East Area leased by the State of Washington from DOE. The facility is licensed by the U.S. Nuclear Regulatory Commission (NRC) and the State of Washington, not DOE. The US Ecology facility is one of three commercial LLW disposal facilities in the United States. It currently accepts waste from two state compacts established to manage radioactive waste from nuclear power plants and other commercial facilities: the Northwest Compact (Washington, Idaho, Oregon, Montana, Wyoming, Utah, Alaska, and Hawaii) and the Rocky Mountain Compact (Colorado, Nevada, and New Mexico). Waste is received from hospitals, universities, research facilities, commercial nuclear power operations, and other industries within the compact states. The reactor vessel from the Trojan plant, a commercial nuclear power reactor in Oregon, was buried at the site during 2000. Of the total waste receipts at the facility between 1996 and 2001, the state of Oregon accounted for the largest share by volume (65%) and by radioactivity (95%).

1.3.1 DOE National Waste Management

When DOE established the Office of Environmental Management (EM) in 1989, it defined cleanup of DOE sites as a top priority and committed itself to addressing the challenges of waste management. EM is responsible for waste management activities at all DOE sites, including Hanford, and needs to address them on a nationwide basis. This section provides an overview of DOE nationwide plans for management of radioactive and hazardous waste, including waste from the Hanford Site. Figure 1.2 shows the nationwide distribution of states in which one or more types of DOE radioactive waste are, or will be, disposed of, including LLW, MLLW, environmental restoration waste, TRU waste, HLW, SNF, and uranium mill tailings. The DOE nationwide strategy for managing radioactive, hazardous, and mixed waste is provided by the WM PEIS (DOE 1997c) and associated Records of Decision (RODs) (63 FR 3629, 63 FR 41810, 64 FR 46661, 65 FR 10061, 65 FR 82985, 66 FR 38646, 67 FR 56989). Other NEPA documents related to those activities are discussed in Section 1.5.

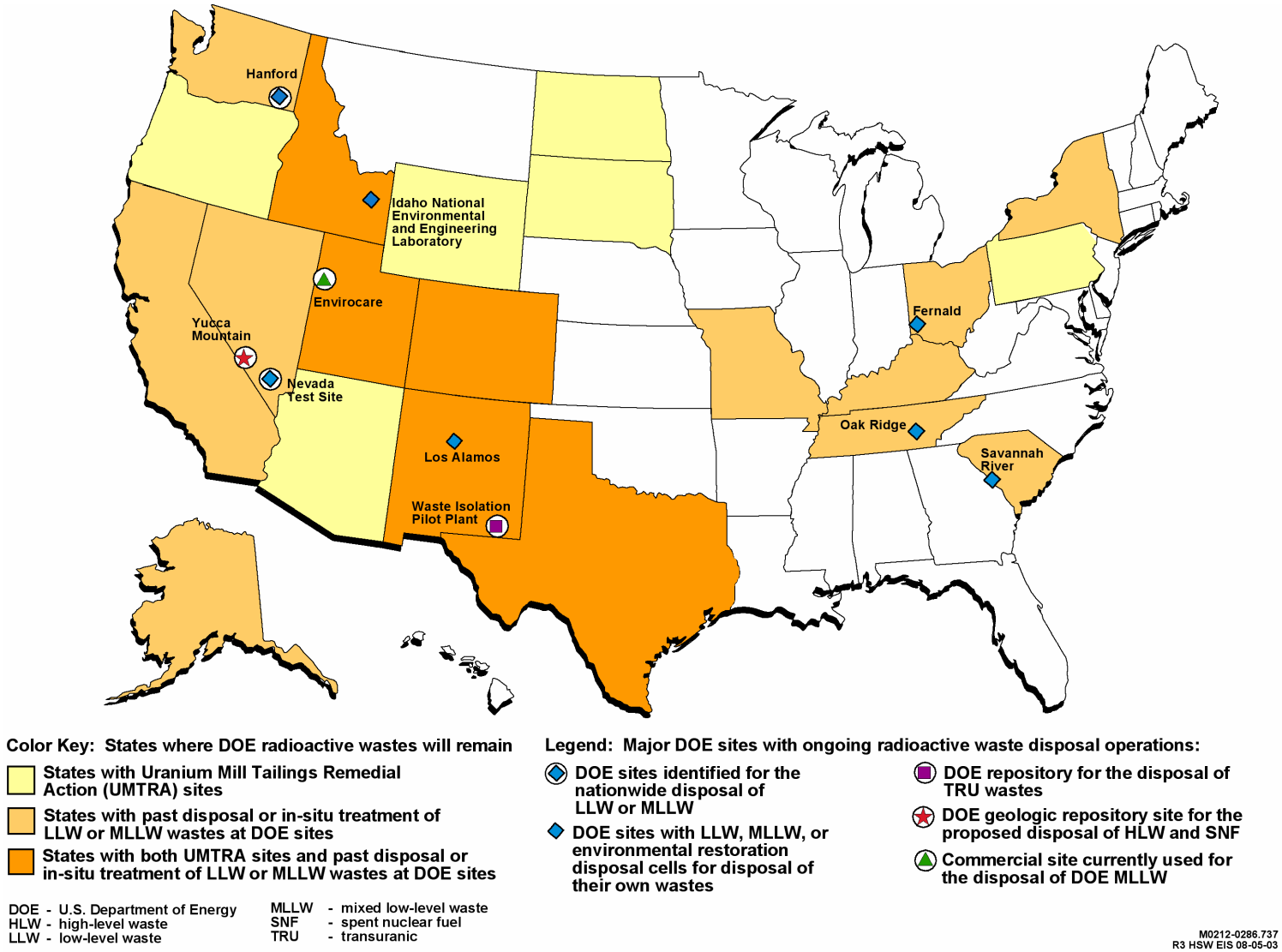

Figure 1.2. States with Radioactive Waste Disposal Activities

1.3.1.1 Spent Nuclear Fuel and High-Level Waste

DOE is required by *The Nuclear Waste Policy Act of 1982*, as amended (42 USC 10101) to provide disposal capacity for spent nuclear fuel (SNF) generated by commercial nuclear power plants and DOE, as well as high-level waste (HLW) generated by atomic energy and defense activities. Spent nuclear fuel is fuel that has been irradiated in a reactor but has not been processed to separate potentially useful materials. High-level waste consists of certain process residues (liquids, solids, or sludges) that result from processing irradiated reactor fuel to recover plutonium and uranium. DOE sites that currently manage HLW and spent nuclear fuel are in the process of stabilizing and storing those materials until a permanent disposal facility is available. DOE is now preparing an application to the Nuclear Regulatory Commission to obtain a license to proceed with constructing a repository for disposal of HLW and SNF at Yucca Mountain in Nevada. The repository is scheduled to open around 2010.

Spent Nuclear Fuel (SNF)

Fuel that has been irradiated in a nuclear power plant or other reactor. Spent fuel is generally thermally hot and highly radioactive.

High-Level Waste (HLW)

High-level waste is the highly radioactive waste material that results from processing of spent nuclear fuel, including liquid waste produced directly in processing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that is determined, consistent with existing law, to require isolation.

1.3.1.2 Transuranic Waste

DOE has a repository for disposal of TRU waste in New Mexico at WIPP. WIPP opened in 1999 and received the first shipments of TRU waste from Hanford in 2000. As of December 2003, about 415 m^3 (14,650 ft^3) of TRU waste from Hanford has been sent to WIPP. Since 1993, about 10.4 m^3 (367 ft^3) of TRU waste has also been sent to Hanford from other DOE sites for temporary storage, and to take advantage of existing and planned capabilities to process and certify TRU waste for disposal at WIPP. All TRU waste sent to Hanford will be shipped to WIPP.

Transuranic (TRU) Waste

Transuranic waste is radioactive waste containing more than 100 nanocuries (3700 becquerels) of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for the following:

- high-level radioactive waste
- waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations
- waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR 61.

Adapted from DOE (2001f).

Some TRU waste may also contain hazardous components (mixed TRU waste) and would be managed under applicable state and federal hazardous waste regulations. For purposes of evaluation in the HSW EIS, mixed TRU waste has not been identified as a separate waste type from other TRU waste.

DOE's hazardous waste permit for WIPP, issued in 1999 by the State of New Mexico Environment Department, currently authorizes disposal of contact-handled mixed TRU waste.

1.3.1.3 Low-Level Waste and Mixed Low-Level Waste

DOE plans to continue treating and disposing of LLW and MLLW at facilities that currently have capabilities to manage those wastes (DOE 1997c; 65 FR 10061). Under that ROD, Hanford and the Nevada Test Site (NTS) will continue to receive LLW from other facilities that do not have the capacity to treat or dispose of it. Hanford and NTS were also identified as sites that could treat and dispose of MLLW from other sites. Regional MLLW treatment could also occur at the Idaho National Engineering and Environmental Laboratory (INEEL), the Oak Ridge Reservation (ORR), and the Savannah River Site (SRS), as well as at offsite commercial facilities. DOE sites also have the option to send waste to commercial disposal facilities, such as Envirocare in Utah. Envirocare received over 56,000 m^3 (2,000,000) of DOE LLW and MLLW between 1993 and 2000 (Envirocare 2000a, b, c). DOE plans to continue shipping some LLW and MLLW to Envirocare. NTS received about 65,000 m^3 (2,300,000 ft^3) of LLW during 2002 and expects to receive an additional 360,000 m^3 (13,000,000 ft^3) through 2006. By comparison, existing forecasts through 2046 indicate that DOE's Hanford Solid Waste Program could receive up to 220,000 m^3 (7,800,000 ft^3) of LLW and up to 140,000 m^3 (4,900,000 ft^3) of MLLW from offsite DOE generators. Total LLW and MLLW annual volumes from offsite generators are not expected to exceed 45,000 m^3 (1,600,000 ft^3).

Low-Level Waste (LLW)
Low-level radioactive waste is radioactive waste that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, byproduct material (as defined in Section 11e.(2) of the Atomic Energy Act of 1954, as amended), or naturally occurring radioactive material.

Mixed Low-Level Waste (MLLW)
Mixed low-level waste is LLW that contains both radionuclides subject to the Atomic Energy Act of 1954, as amended (42 USC 2011), and a hazardous component subject to the Resource Conservation and Recovery Act or Washington State Dangerous Waste Regulations.

The Tank Waste Remediation System (TWRS) EIS summarized formal discussions between DOE and NRC on tank waste classification and how the low-activity portion of the waste might be regulated (DOE and Ecology 1996). Although those consultations were carried out in the context of low-activity waste (LAW) disposal in a grout matrix (Kincaid et al. 1995), the logic was applied to vitrified LAW as well. Based on an NRC published opinion (Bernero 1993; 58 FR 12342), the TWRS EIS analysis concluded that the LAW stream could be classified as incidental waste and subjected to

Low-Activity Waste (LAW)
Low-activity waste is the waste that remains after separating from high-level waste as much of the radioactivity as practicable, and that when solidified may be disposed of as low-level waste in a near-surface facility.

Immobilized Low-Activity Waste (ILAW)
Immobilized low-activity waste is the solidified low-activity waste from the treatment and immobilization of Hanford tank waste. The ILAW would be disposed of on the Hanford Site or at a qualified offsite facility.

disposal requirements for LLW. A second NRC review subsequent to the TWRS EIS indicated that the vitrified waste form selected in the ROD (62 FR 8693) also would provisionally meet criteria for classification as LAW, based on available information provided at that time (NRC 1997).

GTCC radioactive waste is low-level radioactive waste generated under a Nuclear Regulatory Commission (NRC) or agreement state license that exceeds the class C limits in 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste." Part 61.55, "Waste Classification," defines class A, B, and C low-level waste. These waste types are defined by concentration of specific short- and long-lived radionuclides, with class C having the highest concentration limits.

Under the Low Level Radioactive Waste Policy Amendments Act of 1985, the federal government (e.g., DOE) is responsible for the disposal of commercial GTCC radioactive waste. To address its responsibilities under this Act, DOE is considering whether to propose establishing a capability to dispose of GTCC wastes. If DOE makes such a proposal it would prepare appropriate NEPA documentation, such as an environmental impact statement that analyzes alternative technologies and disposal sites. To ensure that it considers the full range of reasonable alternatives in any such EIS as required by NEPA, DOE would evaluate whether Hanford and other DOE sites would be reasonable alternatives for potential disposal of GTCC waste. Although the WM PEIS did not analyze GTCC waste, the Hanford Site was analyzed as a reasonable alternative for potential disposal of other low-level wastes.

1.3.2 DOE Waste Management Activities at Hanford

Waste generated by past Hanford Site activities contains a variety of radionuclides and non-radioactive hazardous constituents. Those materials range from highly radioactive wastes that must be managed in specialized facilities to less radioactive waste that can be managed by more conventional means, such as shallow land disposal. EM activities at the Hanford Site involve radioactive waste and other radioactive materials. These wastes and materials require different management approaches depending on their specific characteristics, location, and legal and regulatory requirements.

DOE's waste management policy includes reducing the hazards of waste to people and the environment by minimizing generation of new waste, by treating waste, by placing waste in safer configurations, and by removing waste from environmentally sensitive areas, such as along the Columbia River.

The Hanford programs for spent nuclear fuel, HLW, environmental restoration, liquid waste and groundwater protection are covered under other NEPA and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 USC 9601) reviews. However, they influence the analyses in this HSW EIS as generators of waste that would ultimately be managed under the resulting decisions. The relationship of the HSW EIS to the major EM activities at the Hanford Site is outlined here (see Volume II, Appendix N for additional information):

- K Basin Sludge: Sludge generated during removal of spent fuel and cleanout of the K Basins would be stored at T Plant until a facility is available to process and certify it for shipment to WIPP. In addition, LLW, MLLW, and TRU waste may be generated during activities at the K Basins.

- Tank waste treatment: ILAW and melters from the WTP would be disposed of in near-surface facilities at Hanford. Waste from WTP operations would also require disposal, including equipment removed from tanks during retrieval of the tank waste, and waste generated during operation of the WTP.

- Environmental restoration activities: TRU waste retrieved during CERCLA cleanup of the 618-10 and 618-11 Burial Grounds would be processed and certified for shipment to WIPP, and other operational waste from cleanup activities may require treatment and disposal. The Environmental Restoration Disposal Facility (ERDF) may also be selected as a potential disposal site for LLW, MLLW, WTP melters, and ILAW. Under DOE policy, NEPA values are integrated into the CERCLA process prior to making remediation decisions (DOE 1994).

- Liquid waste: Leachate from lined disposal trenches would be treated at the Effluent Treatment Facility (ETF), and some solids from ETF would be returned to the Low Level Burial Grounds (LLBGs) for disposal. Other operational waste generated during liquid waste treatment may also be disposed of at Hanford.

1.3.2.1 Groundwater Protection

Groundwater in the unconfined aquifer beneath the Hanford Site ultimately surfaces at springs near or in the Columbia River, which traverses the northern and eastern parts of the site. Some of the groundwater is contaminated by radionuclides and hazardous chemicals as a result of past liquid disposal practices, leaks, and spills.

The past practice of discharging untreated liquid waste to the ground decreased through the 1980s and was discontinued in 1995. Within the 200 Area plateau, two state-permitted discharge sites still exist: the 200 Area Treated Effluent Disposal Facility and the State-Approved Land Disposal Structure (SALDS). Tritiated water is discharged at the SALDS in accordance with DOE Order 5400.5 (DOE 1993). There is no practicable technology available for removing tritium from dilute liquid waste streams. Currently, DOE uses the long transit time in groundwater from the discharge point to the Columbia River to allow tritium to decay. Allowing the tritium to decay in the groundwater while isolated from public use is an acceptable alternative to direct release to the atmosphere or to surface water.

Programs are under way to stabilize and clean up remaining materials, soil, and groundwater plumes that could present a threat to human health and the environment in the future. Ongoing radioactive and hazardous waste management practices comply with applicable standards, and they are evaluated on a continuing basis to minimize environmental degradation. Groundwater monitoring at Hanford is being addressed under milestones established by the TPA independently of this HSW EIS. Groundwater monitoring requirements would apply to any actions DOE may decide to implement as a result of the analyses conducted under this HSW EIS.

DOE and a team of contractors have developed, and are implementing, a sitewide program that integrates all assessment and remediation activities that address key groundwater, vadose zone, and related Columbia River issues. This effort is coordinated by the Groundwater Protection Program to

support cleanup and closure decisions for the Hanford Site and protection of the Columbia River. General information regarding Hanford's Groundwater Protection Program can be found in Volume II, Appendix N and at http://www.hanford.gov/cp/gpp. Information developed under that program was used to evaluate long-term impacts of LLW and MLLW disposal in this HSW EIS.

1.3.2.2 The Tri-Party Agreement

Beginning in 1986, DOE, the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) began to examine how best to bring the Hanford Site into compliance with RCRA, CERCLA, and applicable state hazardous waste regulations. The regulatory agencies and DOE agreed to develop one compliance agreement establishing milestones for conducting Hanford Site cleanup activities under CERCLA and for bringing operating facilities into compliance with RCRA. Negotiations concluded in late 1988, and the TPA was signed by the three participating agencies on January 15, 1989 (Ecology et al. 1989). The TPA includes a process for revising milestones by mutual agreement of the agencies. Milestones established under the TPA influence some activities proposed in this HSW EIS. The TPA is discussed further in Section 6.3.

1.3.2.3 DOE Decisions Related to Waste Management at Hanford

Several decisions have already been made that affect the management of various wastes and other nuclear materials at Hanford. Some of the decisions described in this section are being implemented, and other actions are scheduled to begin at a future time. The relationship between those activities and the alternatives for waste treatment, storage, and disposal as discussed in this HSW EIS is depicted in Figure 1.3. The NEPA and CERCLA reviews that resulted in the decisions illustrated in the figure are also listed. The relationship of the HSW EIS to other documents is further discussed in Section 1.5.

- HLW in Hanford storage tanks will be retrieved and vitrified at an onsite facility. DOE plans to dispose of HLW in a geologic repository at Yucca Mountain in Nevada (DOE 2002d). The TWRS EIS ROD (62 FR 8693) calls for ILAW to be placed in concrete vaults on the Hanford Site.

- Spent nuclear fuel stored in the Hanford K Basins near the Columbia River will continue to be dried and moved to the 200 East Area until it can be sent to the Yucca Mountain repository. A small quantity of other reactor fuel currently stored at Hanford will also be stored in the 200 East Area until it can be disposed of at Yucca Mountain.

- The Hanford Site will manage TRU waste from onsite operations, such as stabilization of plutonium materials at former processing facilities, and from some other DOE sites that do not have capabilities to manage TRU waste (see Volume II, Appendix C, Table C.1). In addition, TRU waste will be retrieved from the 618-10 and 618-11 Burial Grounds near the Energy Northwest Complex, and retrievably stored TRU waste will be retrieved from the 200 Area LLBGs. TRU waste will be treated as necessary and certified for disposal at WIPP near Carlsbad, New Mexico.

- LLW and MLLW from Hanford and other DOE sites will continue to be stored, treated, and/or disposed of at Hanford.

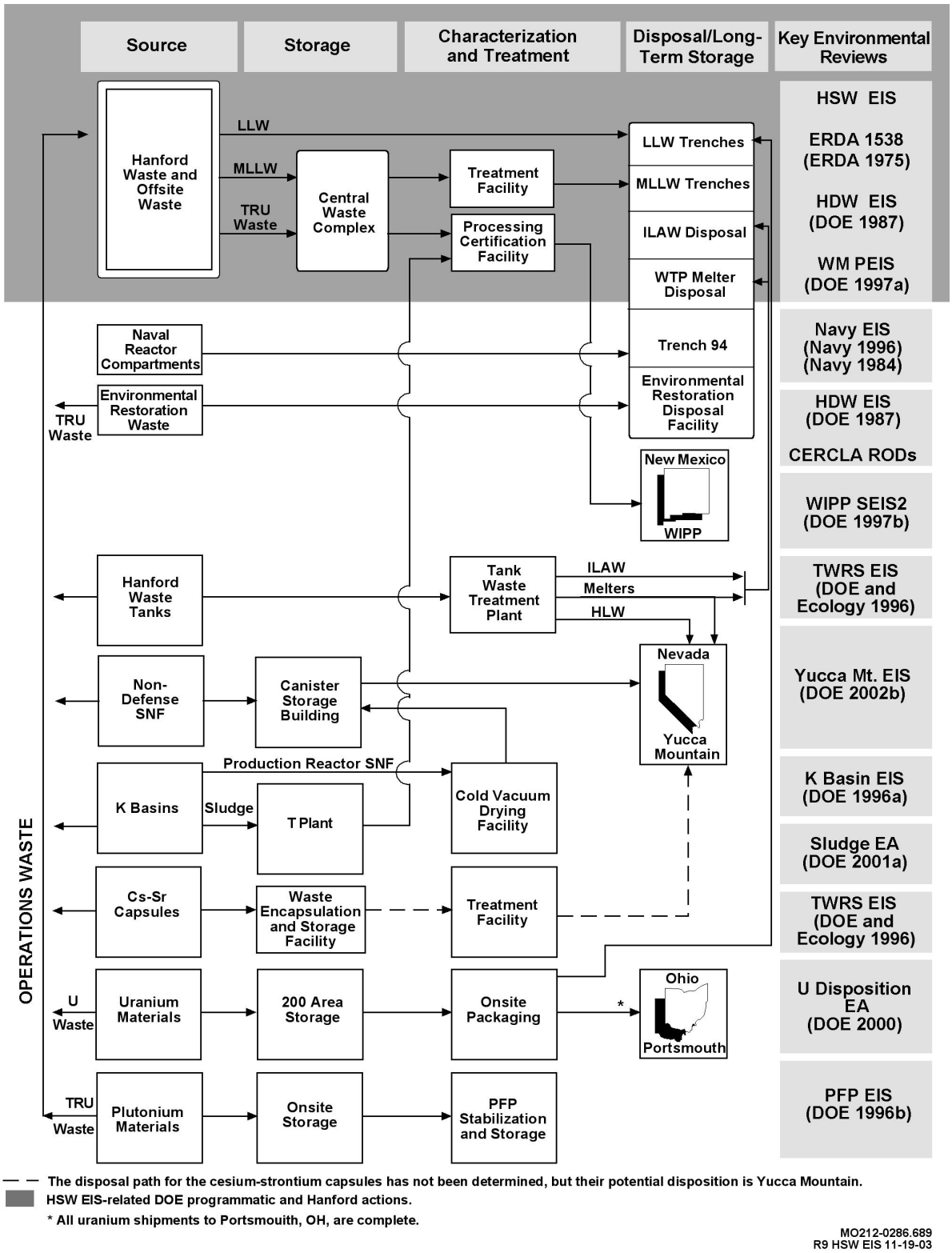

Figure 1.3. Relationship of the HSW EIS to Other Hanford Cleanup Operations, Material Management Activities, and Key Environmental Reviews

- Reactor compartments from decommissioned naval vessels will continue to be disposed of in a dedicated facility at Hanford.

- Contaminated areas along the Columbia River will continue to be cleaned up, especially sites near closed reactors in the 100 Areas and near fuel fabrication facilities in the 300 Area. Closed reactors will be placed into interim safe storage (a process referred to as "cocooning") to protect people and the environment from the reactor cores until they can be safely removed. The 200 Area non-tank farm investigation activities are scheduled to be completed by December 31, 2008, pursuant to Milestone M-15-00C of the TPA. Most LLW and MLLW generated during Hanford environmental restoration projects will be sent to a dedicated onsite disposal facility, the Environmental Restoration Disposal Facility (ERDF).

The activities described in this section will result in most of the radioactive materials at Hanford being relocated to offsite facilities for disposal or other disposition. Figure 1.4 shows DOE's radioactive material disposition plans at Hanford based on their radioactive material content.

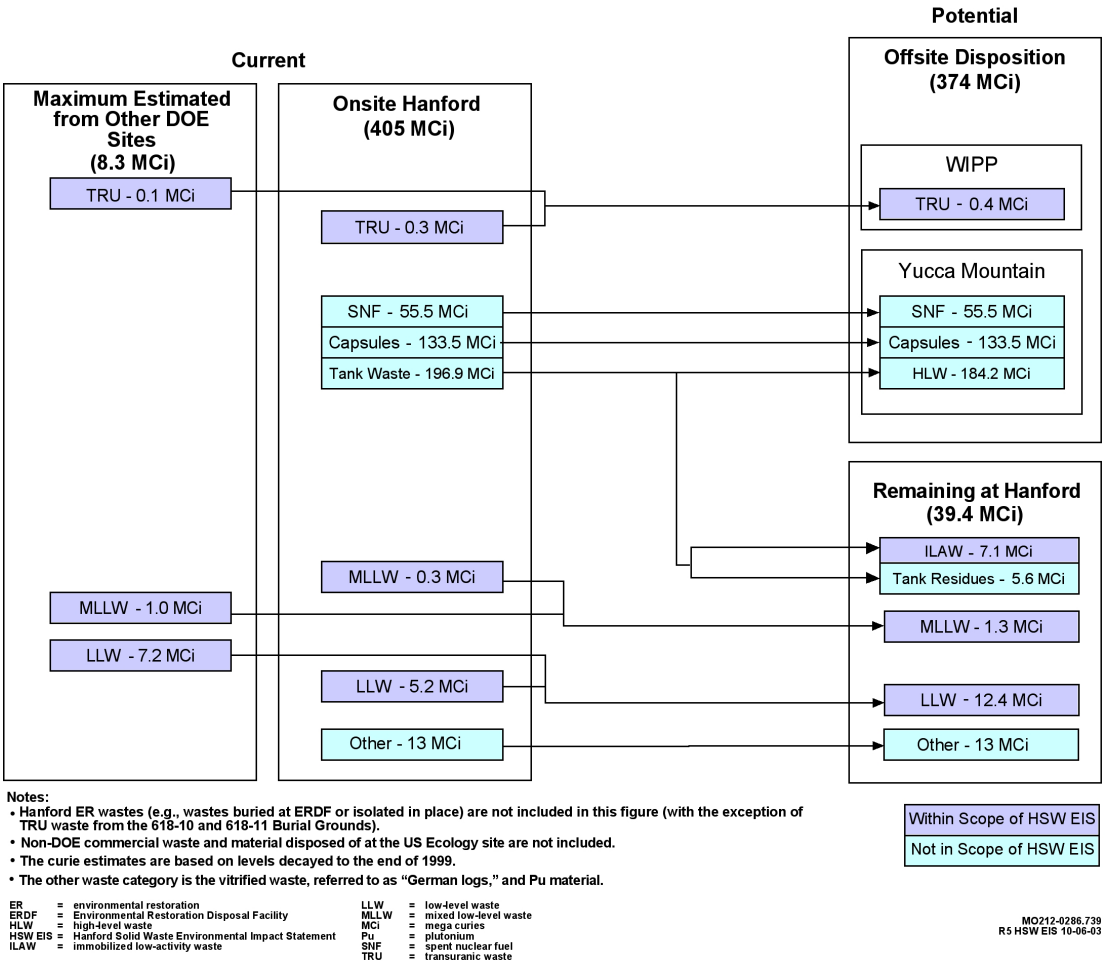

Figure 1.4. Radioactive Material Disposition at Hanford in Terms of Waste Activity (MCi)

1.3.2.4 Recent Regulatory Agreements

On October 24, 2003, the United States and the State of Washington executed a settlement agreement (United States of America and Ecology 2003) resolving certain disagreements between the State of Washington and the United States with regard to changes to TPA milestones related to transuranic waste and mixed low-level waste. This settlement agreement also resolved a related administrative order issued by the Washington State Department of Ecology on April 30, 2003 (Ecology 2003) with regard to storage and treatment of mixed transuranic waste.

As a result of the settlement agreement, the sequence for retrieval of retrievably stored transuranic waste from the Low Level Burial Grounds may change from the sequence anticipated in DOE's previous plans as described in DOE (1987, 2002c). In addition, DOE will, as part of these retrieval activities, characterize for purposes of RCRA (42 USC 6901) and state dangerous waste regulations (WAC 173-303) the waste retrieved from these LLBGs. The MLLW would be appropriately treated, stored, and/or disposed of in compliant facilities. It is anticipated that the vast majority of MLLW would constitute debris waste under RCRA, for which the required treatment is macroencapsulation. A small component of the MLLW may require treatment by other methods (see Section 2.1.2). The specific quantities of retrievably stored suspect transuranic waste in the LLBGs that may need such treatment would not be known until retrieval operations are conducted. The retrieval would take place in the manner set forth in DOE (1987, 2002c). The worker and environmental consequences of retrieval activities are expected to be consistent with those described in the previously published documents (as summarized in Section 1.5.2). As a result of these actions, DOE expects the long-term environmental impacts of Hanford solid waste disposal could be slightly less than the impacts set forth in this HSW EIS because, for purposes of performing a conservative analysis, it was assumed that this MLLW would remain untreated and in an unlined facility. DOE would monitor these retrieval activities to determine whether additional environmental reviews are appropriate.

1.4 Related Department of Energy Initiatives at the Hanford Site

Recent DOE management initiatives have provided a framework for alternatives being evaluated in this EIS. These initiatives are summarized in the following sections; additional information is provided in Volume II, Appendix N.

1.4.1 EM Top-to-Bottom Review

In 2001, DOE reviewed its efforts to clean up 114 sites nationwide that are managed as part of DOE's Environmental Management Program (DOE 2002a). Cleanup of 74 of those sites is complete, and cleanup efforts at other sites are well under way. However, costs and schedules for the more extensive cleanup efforts, including Hanford, were expected to increase unless there were major changes in the way cleanup work was being managed. That review, referred as the Top-to-Bottom Review, was intended to identify problems and recommend improvements to accelerate cleanup, reduce risks, and reduce costs.

The review concluded that DOE's emphasis was on managing risks to people and the environment rather than reducing those risks. The review identified 12 issues and related recommendations, some of

which could change current plans for managing waste at Hanford if they are implemented. Some of the recommendations made in the Top-to-Bottom Review could be implemented immediately. Some, including the possible changes to waste management activities at Hanford, would require additional planning. Prior to implementation of any of the recommendations, appropriate environmental documentation would be prepared.

1.4.2 DOE Cost Report

In 2002, DOE prepared a life-cycle cost analysis addressing the disposal of DOE's low-level waste (DOE 2002e). Life-cycle disposal costs include those related to transportation, disposal, closure, and long-term stewardship. The report discussed facilities for the disposal of LLW from cleanup actions under CERCLA (e.g., the Environmental Restoration Disposal Facility) as well as facilities used for other LLW disposal (e.g., the LLBGs). The report was prepared to address congressional concerns regarding the cost of LLW disposal, the extent to which DOE fee structures reflect actual life-cycle costs, and the impact of DOE disposal facilities on commercial LLW disposal.

The report concluded that pre-disposal costs, such as packaging and transportation, offer the greatest opportunity for cost savings. DOE disposal facilities established for CERCLA cleanup actions typically had the lowest life-cycle disposal costs per unit of waste because of the nature of wastes disposed of at those facilities. Commercial facilities may be more cost-effective for some types of waste; however, DOE facilities provide services that are not available at commercial facilities. In general, the report recommended that DOE consider all elements of life-cycle costs, in addition to disposal fees, in making decisions regarding LLW disposal.

1.4.3 Cleanup, Constraints, and Challenges Team (C3T)

In 2001, the DOE Richland Operations Office (DOE-RL), its contractors, EPA, and Ecology began a series of discussions to better identify, characterize, and resolve constraints and barriers to Hanford cleanup. Tribal nations were also invited to participate in these discussions. These discussions, referred to as the Cleanup, Constraints, and Challenges Team (C3T) process, are designed to be an informal forum where ideas and concepts could be discussed openly (DOE-RL 2002a). Ideas are developed and evaluated to determine whether they could accelerate cleanup; reduce costs; or protect workers, the public, and the environment. The C3T process is not intended to replace legal or regulatory requirements, or to change formal commitments such as the TPA. Some concepts identified during the C3T process might be suitable for immediate implementation. However, most would probably require further planning, changes to existing permits and TPA Milestones, changes to existing contracts, and preparation of additional NEPA or CERCLA reviews. Additional information can be found in Volume II, Appendix N.

1.4.4 Hanford Performance Management Plan (HPMP)

Drawing on recommendations contained in the Top-to-Bottom Review and on ideas emerging from the C3T process (DOE-RL 2002a), a plan was prepared to accelerate cleanup at Hanford (DOE-RL 2002b). The plan describes higher-level strategic initiatives as well as specific goals for completing Hanford cleanup by 2035, which is 35 years earlier than previously planned.

Some of the acceleration activities described in the HPMP could be implemented immediately. Others could be implemented as a result of reviews performed under this HSW EIS. Some, however, would require further planning, changes to existing permits and TPA milestones, and preparation of additional NEPA or CERCLA reviews. Implementation of some of the accelerated cleanup proposals is discussed in Section 3. However, the plans and schedules associated with many HPMP proposals were not sufficiently well developed for detailed analysis at the time this EIS was prepared. Therefore, the analyses of environmental impacts presented in Section 5 do not necessarily reflect all activities, or the timing of some activities, as described in the HPMP. Additional information can be found in Volume II, Appendix N.

1.5 Relationship of the HSW EIS to Other Hanford and DOE NEPA Documents

A number of other DOE programmatic and Hanford actions are related to this HSW EIS. The relationships of these actions and associated NEPA documents to the HSW EIS are described in the following sections and were illustrated previously in Figure 1.2.

1.5.1 Interim Actions During Preparation of the HSW EIS

During the preparation of the HSW EIS, DOE determined that several actions within or related to the scope of the EIS met the criteria for permissible interim actions under 40 CFR 1506.1. These actions are described in the following documents:

- **Offsite Thermal Treatment of Low-Level Mixed Waste (DOE/EA-1135 May 1999)**

  This Environmental Assessment (EA) analyzed the use of Allied Technology Group, Inc. (ATG), a commercial treatment facility in Richland, Washington, to thermally treat a portion of MLLW stored at the Hanford Site (DOE 1999a). DOE considered the use of ATG for treatment of a limited quantity of MLLW from Hanford as a demonstration project. This EA analyzed impacts of transporting the MLLW from Hanford to ATG, treatment of the waste in the ATG facility, and transportation of the treated waste back to Hanford for disposal. Construction and operation of the ATG treatment facility was evaluated in a State Environmental Policy Act (SEPA) EIS (City of Richland 1998). Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a finding of no significant impact (FONSI) on May 6, 1999.

- **Non-Thermal Treatment of Hanford Site Low-Level Mixed Waste (DOE/EA-1189 September 1998)**

  This EA considered the use of the ATG commercial treatment facility to stabilize or encapsulate a portion of Hanford MLLW to allow disposal of the waste (DOE 1998). Regulatory requirements for treatment of MLLW to allow land disposal vary depending upon the nature of the waste. Wastes considered in this EA consisted of those that did not require thermal treatment. The ATG facility was

also considered for thermal treatment of a portion of the Hanford MLLW (DOE 1999a). Construction and operation of the ATG treatment facility was evaluated in a SEPA EIS (City of Richland 1998). Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on September 29, 1998.

- **Widening Trench 36 of the 218-E-12B Low-Level Burial Ground (DOE/EA-1276 February 1999)**

  This EA was prepared to assess potential environmental impacts associated with the proposed action to widen and operate the existing and unused Trench 36 in the 218-E-12B LLBG for disposal of bulk LLW (DOE 1999b). The existing V-type LLW trenches were designed before 1976 and were analyzed in a previous Environmental Statement (ERDA 1975). DOE determined the trench design was inefficient for disposal of bulk waste. The V-type trenches are narrow at the bottom and are generally less than about 5 m (16 ft) deep. DOE determined that widening the trenches would more efficiently use LLBG space. Given trenches of equivalent depth, the wider trenches allow more waste to be placed per square foot of surface area. This pattern not only saves trench construction costs but also decreases closure cover size and cost for disposal of a given volume of waste. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on February 11, 1999.

- **K Basins Sludge Storage at 221-T Building, Hanford Site, Richland, Washington (DOE/EA-1369 June 2001)**

  This EA was prepared to assess potential environmental impacts associated with modification of the 221-T Building (part of the T Plant Complex) to receive and store sludge from the 100-K Area fuel storage basins at the Hanford Site (DOE 2001b). The proposed action included modification of the pool cell and other shielded cells within the facility to store the sludge. The sludge would ultimately be designated as RH TRU waste and transferred to the Hanford Solid Waste Program for storage, processing at an onsite facility, and shipment to WIPP for disposal. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on June 20, 2001.

- **(Draft) Environmental Assessment for Trench Construction and Operation in the 218-E-12B and 218-W-5 Low Level Burial Grounds, Hanford Site, Richland, Washington (DOE/EA-1373 February 2001)**

  This draft EA was prepared to assess potential environmental impacts associated with the proposed action to construct four new LLW disposal trenches in the Hanford Site 200 East and 200 West Areas (DOE 2001a). Additional trench capacity was determined to be necessary over the short-term for operational efficiency in disposing of different physical types of LLW at Hanford. The EA has not been finalized.

1.5.2 Related NEPA Documents

Solid waste management operations at Hanford have been assessed previously in a number of documents. This section briefly describes other NEPA documents related to the HSW EIS. They offer background material for understanding the HSW EIS and its purpose.

- **Final Environmental Statement, Waste Management Operations, Hanford Reservation, Richland, Washington (ERDA-1538 December 1975)**

  The U.S. Energy Research and Development Administration (ERDA) prepared an Environmental Statement for use in planning and decision making to ensure that future waste management practices would minimize adverse environmental consequences (ERDA 1975). Treatment and disposal of waste from onsite and offsite sources were addressed. This document was written for the Waste Management Operations Program at the Hanford Site. Because this document predated the CEQ NEPA regulations, a formal ROD was not issued. The HSW EIS provides an updated analysis and revisits potential alternatives for some aspects of Hanford Solid Waste Program operations.

- **Disposal of Decommissioned Defueled Naval Submarine Reactor Plants EIS (U.S. Department of the Navy 1984)**

  This EIS considered the disposal of defueled naval submarine reactor compartments in the Hanford LLBGs (Navy 1984). The EIS was prepared by the U.S. Department of the Navy and was adopted by DOE. The EIS analyzed preparation of the reactor compartments at the Puget Sound Naval Shipyard, transportation to Hanford, and disposal in the 200 Areas. The ROD was published in the *Federal Register* on December 6, 1984 (49 FR 47649).

- **Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, Hanford Site, Richland, Washington (DOE/EIS-0113 December 1987)**

  In 1987, DOE prepared the Hanford Defense Waste (HDW) EIS to examine potential impacts storing and preparing TRU waste and tank waste, as well as future wastes, for disposal (DOE 1987). Most LLW and wastes associated with decommissioning of existing surplus or retired Hanford Site facilities were not considered in the HDW EIS. In the 1988 ROD (53 FR 12449), DOE decided to dispose of or store double-shell tank waste and cesium and strontium capsules. Retrievably stored TRU waste in the 200 Area LLBGs would be retrieved and disposed of with other newly generated TRU waste. A decision was also made to retrieve buried suspect TRU-contaminated waste from the 618-11 Burial Ground. As part of that decision, DOE decided to construct and operate a facility for vitrification of HLW, facilities for grout stabilization and disposal of the low-activity fraction from processing tank waste, and the Waste Receiving and Processing (WRAP) facility for processing, certification, and shipment of TRU waste. Subsequent to preparation of the HDW EIS, the TPA was established to implement many of the actions discussed in the ROD. The agreement also ensures compliance with applicable RCRA, CERCLA, and State of Washington requirements.

This HSW EIS provides an updated analysis for some Hanford Solid Waste Program operations previously evaluated in the HDW EIS, such as processing and certification of TRU waste and disposal of ILAW. For some other activities evaluated in the HDW EIS, such as retrieval and processing of Hanford tank waste, additional NEPA review has either been prepared or may be prepared required in the future. For example, the TWRS EIS updated some aspects of retrieval, processing, and disposal of Hanford tank waste (DOE and Ecology 1996). In addition, the EIS for retrieval, treatment, and disposal of Hanford tank waste and for closure of 149 single-shell tanks (68 FR 1052) would provide further updates of some activities addressed in the HDW EIS, the TWRS EIS, and this HSW EIS.

The HSW EIS assumes complete retrieval of TRU waste stored in the LLBGs and caissons based on the HDW EIS ROD. The consequences from the HDW EIS alternative for retrieving and processing both retrievably stored and newly generated TRU waste for disposal at a geologic repository are summarized in Table 1.1. An initial project to retrieve about 20 percent of the TRU waste volume stored in the LLBGs has been evaluated in a recent EA (DOE 2002c). Retrieval of the remaining TRU waste would be based on experience gained during the initial project, with additional NEPA review as appropriate. Processing, certification, and transportation of TRU waste to WIPP are evaluated in Section 5 of this HSW EIS.

Table 1.1. Consequences of Retrieving and Processing TRU Waste as Evaluated in the HDW EIS

Activity	Geologic Disposal Alternative
Routine Operations	
Occupational Radiation Dose (person-rem)	140
Radiation Dose to Maximally Exposed Offsite Individual over 70 years (rem)	1E-4
Radiation Dose to Offsite Population over 70 years (person-rem)	9
Facility Accidents	
Radiation Dose to Maximally Exposed Offsite Individual (rem)	5E-2
Collective Radiation Dose to Offsite Population (person-rem)	100
Non-Radiological Impacts	
Occupational Illness & Injury (number of recordable events)	520
Occupational Fatality (number of events)	2

- **Environmental Assessment for Battelle Columbus Laboratories Decommissioning Project (DOE/EA-0433 June 1990)**

  This EA evaluated decommissioning of radiological laboratories operated by Battelle Memorial Institute (DOE 1990). Waste, including TRU waste, generated during the cleanup of 15 buildings at two sites would be shipped to Hanford. The TRU waste would be stored until it could be accepted at WIPP. DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on June 14, 1990.

- **Environmental Assessment – Hanford Environmental Compliance Project, Hanford Site, Richland Washington (DOE/EA-0383 March 1992)**

  This EA included an evaluation for construction and operation of the ETF in the Hanford Site 200 East Area (DOE 1992). This facility would receive leachate collected from the MLLW trenches, in addition to other liquid waste generated at Hanford. The EA also evaluated construction of additional storage buildings at the Central Waste Complex (CWC). Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on March 11, 1992.

- **Solid Waste Retrieval Complex, Enhanced Radioactive and Mixed Waste Storage Facility, Infrastructure Upgrades, and Central Waste Complex (DOE/EA-0981 September 1995)**

  In this EA, DOE proposed to construct and operate the Solid Waste Retrieval Complex and the Enhanced Radioactive Mixed Waste Storage Facility, to expand the CWC, and to upgrade the associated Hanford infrastructure (DOE 1995b). These facilities were to be located in the 200 West Area to support the Solid Waste Operations Complex (SWOC) operation. The proposed action was to address retrieval of TRU waste, storage capacity for retrieved and newly generated TRU waste, and upgrading the infrastructure network in the 200 West Area to enhance operational efficiencies and reduce the cost of operating the existing SWOC. Actions evaluated in the EA included

  - construction and operation of the Retrieval Complex and the Enhanced Radioactive Mixed Waste Storage Facility

  - expansion of the CWC

  - upgrading associated infrastructure (that is, utilities and roads) in the 200 West Area to support the SWOC

  - retrieval of TRU waste in the solid waste LLBGs and the construction, operation, and maintenance of a complex of facilities to be used for the retrieval

  - construction of a regulatory-compliant storage facility for greater than Category 3 (GTC3) waste, retrieved TRU waste and newly generated TRU waste awaiting processing in the WRAP, and for processed waste awaiting shipment to WIPP

- construction of two pre-engineered metal solid waste management support buildings.

In addition, the proposed action included a mitigation strategy to address lost shrub-steppe habitat. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on September 8, 1995. This HSW EIS considers post-retrieval processing, certification, and shipment to WIPP for retrievably stored TRU waste in the LLBGs.

- **Environmental Assessment. Shutdown of the Fast Flux Test Facility. Hanford Site, Richland, Washington (DOE/EA-0993 May 1995)**

  This EA was prepared to assess environmental impacts from shutdown of the Fast Flux Test Facility, a liquid-metal cooled research reactor located in the Hanford Site 400 Area (DOE 1995a). Deactivation would consist of removing fuel, draining and de-energizing the systems, removing the stored radioactive and hazardous materials, and performing other actions to place the facility in a safe shutdown state. Deactivation of this facility could generate LLW, MLLW, or TRU waste that would be processed or disposed of in facilities considered under the HSW EIS. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on May 1, 1995.

- **Management of Spent Nuclear Fuel from the K Basins at the Hanford Site, Richland, Washington (DOE/EIS-0245 January 1996)**

  This EIS evaluated alternatives for treatment and interim storage of irradiated fuels from the Hanford production reactors (DOE 1996b). After the reprocessing of production reactor fuels for weapons material at Hanford was suspended, a substantial quantity of unprocessed irradiated fuel remained in the fuel storage basins at the 100-K Area. As a result of the EIS analysis, DOE decided to stabilize the stored fuel using a cold vacuum drying process, package the fuel into storage canisters, and place the canisters into storage in the 200 East Area at Hanford. The EIS also addressed cleaning out the 100-K Area fuel storage basins following removal of the fuel. The EIS evaluated storage of the retrieved sludge in underground tanks for eventual treatment with other Hanford tank wastes, or alternatively, grouting the sludge fractions that could be disposed of at Hanford. A ROD was issued in the *Federal Register* on March 15, 1996 (61 FR 10736). The HSW EIS evaluates storage and treatment of the sludge by the Hanford Solid Waste Program, an alternative not considered in the K Basin EIS. The treated sludge would ultimately be disposed of at WIPP with other Hanford TRU waste.

- **Plutonium Finishing Plant Stabilization Final Environmental Impact Statement (DOE/EIS-0244-F May 1996)**

  The Plutonium Finishing Plant (PFP) in the Hanford Site 200 West Area was constructed to process plutonium nitrate into the metallic form used in nuclear weapons. The PFP includes production and

recovery areas, laboratories for routine analysis and research, and secure vaults for storage of plutonium. PFP ceased operations in 1989. DOE prepared the PFP EIS (DOE 1996c) to evaluate consequences from

- stabilization of plutonium-bearing materials at the PFP to a form suitable for interim storage
- removal of readily retrievable, plutonium-bearing materials left behind in process equipment, process areas, and air and liquid waste management systems as a result of historic uses
- placement of stabilized fissile material in existing vaults at the PFP for interim storage.

The alternatives for stabilization included processing the plutonium-bearing materials into a form suitable for interim storage in existing PFP vaults. The EIS also evaluated options for removing and stabilizing plutonium-bearing wastes and material in holdup at the PFP. A ROD was issued in the *Federal Register* on June 25, 1996 (61 FR 36352). Stabilization of the PFP materials and deactivation of the facility have been, and will continue to be, major sources of TRU waste managed by the Hanford Solid Waste Program.

- **Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants (DOE/EIS-0259 April 1996)**

  This EIS considered the disposal of certain defueled Naval Reactor plants in a Hanford LLBG. The EIS was prepared by the U.S. Department of the Navy (1996). The EIS analyzed preparation of the reactor compartments at the Puget Sound Naval Shipyard, transportation to Hanford, and disposal in the 218-E-12B Burial Ground in the Hanford 200 East Area. DOE participated as a cooperating agency in the development of the EIS on this federal action and has adopted the EIS. The ROD was issued in the *Federal Register* on August 9, 1996 (61 FR 41596).

- **Tank Waste Remediation System EIS (DOE/EIS-0189 August 1996)**

  In the TWRS EIS, DOE examined the management and disposal of the contents of 177 tanks in the HLW tank farms, as well as cesium and strontium capsules (DOE and Ecology 1996). In the ROD, DOE decided to retrieve, separate, vitrify, and dispose of the tank waste (62 FR 8693). The low-activity waste fraction from the separation process would be placed in concrete vaults onsite. The HLW would be disposed of at a repository. A decision on the disposition of cesium and strontium capsules was deferred. Programs for retrieval and treatment of the tank waste are expected to be major generators of LLW and MLLW sent to the Hanford Solid Waste Program for disposal in Hanford LLBGs. Disposal of ILAW, melters, and operational waste from the tank waste treatment plant are considered in the waste streams evaluated for this HSW EIS.

- **Supplemental Environmental Impact Statement for Disposal of Immobilized Low-Activity Wastes from Hanford Tank Waste Processing (DOE/EIS-0189-S1)**

  As part of the TWRS EIS decision, DOE planned to place ILAW into concrete vaults in the 200 East Area. DOE began examining alternatives for disposing of ILAW onsite in near-surface facilities. Following a supplement analysis of disposal options for ILAW (DOE 2001g), DOE decided additional NEPA review was required, and a Notice of Intent to prepare a Supplemental Environmental Impact Statement (SEIS) was issued on July 8, 2002 (67 FR 45104). Subsequently, based on public comments received, DOE decided to combine the ILAW disposal SEIS with this HSW EIS. The HSW EIS now provides a NEPA review for ILAW disposal in addition to waste management operations conducted by the Hanford Solid Waste Program (68 FR 7110).

- **Environmental Impact Statement for Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site, Richland, Washington (DOE/EIS-0356)**

  DOE recently announced its intent to prepare a follow-on EIS to the TWRS EIS for retrieval, treatment, and disposal of Hanford tank waste, and for closure of 149 single-shell tanks (68 FR 1052). That EIS would evaluate alternative treatment processes for some tank waste and disposal of low-activity waste forms other than those considered in this HSW EIS. The HSW EIS evaluates disposal of secondary LLW and MLLW generated during retrieval and treatment of Hanford tank waste based on current waste forecasts. If those waste forecasts change substantially as a result of potential new tank waste treatment technologies or modified design for the WTP, additional evaluation of LLW and MLLW disposal impacts may be provided as part of the proposed Tank Closure EIS (68 FR 1052) or other appropriate NEPA review.

- **Waste Management Programmatic EIS (DOE/EIS-0200 May 1997)**

  The WM PEIS is a DOE nationwide study examining the environmental impacts of managing more than 2,000,000 m^3 (2,700,000 yd^3) of radioactive wastes from past, present, and future DOE activities (DOE 1997c). The DOE goal in preparing the WM PEIS was to develop a national strategy to treat, store, and dispose of the wastes in a safe, responsible, and efficient manner that minimizes the impacts to workers, the public and the environment. DOE used the analyses in the WM PEIS to decide on a programmatic approach to managing its waste, and to select a configuration of DOE sites for waste management activities based on those analyses and other factors.

  The level of analysis in the WM PEIS was judged appropriate for making broad programmatic decisions on which DOE sites should be selected for waste management missions. However, at the programmatic level, it was not possible to take into account special requirements for particular waste streams, different technologies that are, or may be, available to manage specific wastes, or site-specific environmental considerations such as the presence of culturally important resources or endangered species at a given location on a site. DOE is relying on other NEPA reviews for those analyses, primarily ones that evaluate particular locations or projects. Decisions regarding specific

locations for waste management facilities at DOE sites, the waste management technologies to be used, and potential mitigation measures will be made on the basis of existing or new sitewide or project-level NEPA reviews.

Wastes analyzed in the WM PEIS result primarily from nuclear weapons production and related activities. They include MLLW, LLW, TRU waste, HLW, and hazardous waste. The WM PEIS provides information on the impacts of various alternatives that DOE evaluated to decide at which sites to consolidate or decentralize treatment, storage, and disposal activities for each waste type. The WM PEIS evaluated a total of 36 alternatives for the 5 waste types. The alternatives represented different configurations for managing each waste type at varying numbers of DOE facilities. The alternatives were described as decentralized, regionalized, or centralized, depending on the degree to which waste management activities were consolidated or distributed across the DOE waste generator sites. A no action alternative was also evaluated, in which only existing waste management capabilities would be used.

In the decentralized alternatives, each site that generates waste would manage the waste onsite. Unlike the no action alternative, the decentralized alternatives would involve construction of new waste management facilities at a larger number of sites than in the other alternatives (5-37 sites, depending on the waste type and activity). At least two regionalized alternatives were evaluated for each waste type, where waste management activities would be consolidated at a smaller number of sites than in the decentralized alternatives, but at a greater number of sites than in the centralized alternatives (1-12 sites, depending on the waste type and activity). The sites identified as regionalized waste management sites for a given waste type were expected to generate relatively large quantities of that waste, and they generally had existing waste management facilities and capabilities. The centralized alternatives evaluated consolidated management of each waste type at the smallest number of sites (1-7 sites, depending on the waste type and activity), again representing sites that were expected to generate the largest quantities of a particular waste.

Management of CERCLA waste generated by DOE environmental restoration activities was reviewed, but not comprehensively analyzed, in the WM PEIS. However, waste from decommissioning and closure of some smaller DOE sites was considered as part of the total waste volumes to be managed within the DOE complex. The Natural Resources Defense Council and other non-governmental groups filed a lawsuit in 1997 to require DOE to prepare a programmatic EIS for its environmental restoration program. The lawsuit was settled in 1998 when DOE and the other parties agreed to develop tools that would enhance public understanding of DOE site cleanup. Under the terms of the settlement, no changes were made to the WM PEIS. DOE agreed to complete the following items:

1. Develop and deploy a Central Internet Database with information on waste, materials, facilities, and contaminated media (see: http://cid.em.doe.gov/).

2. Conduct a study on long-term stewardship (DOE 2001e).

3. Establish a $6.25 million fund for technical and scientific reviews by citizen and tribal organizations.

The draft WM PEIS was issued in September 1995, followed by a 150-day public comment period. The Final WM PEIS was issued in May 1997, and the initial decisions for each waste type analyzed in the WM PEIS were issued between January 1998 and February 2000. Several amendments to the original decisions were subsequently issued to address specific waste management needs that were not included in the initial RODs. Major decisions resulting from the WM PEIS are summarized by waste type as follows:

- **TRU Waste**. DOE decided that, with one exception, TRU waste at DOE sites would be treated and stored at the generator sites prior to disposal at WIPP (63 FR 3629). The decision was later revised to transfer small quantities of TRU waste to other sites that have existing storage and treatment capabilities (65 FR 82985, 66 FR 38646, 67 FR 56989). In one of those revisions (67 FR 56989), DOE decided that about 36 m^3 (1300 ft^3) of TRU waste from facilities in Ohio and California would be transferred to Hanford for storage and processing before being shipped to WIPP.

- **Low-Level Waste and Mixed Low-Level Waste**. Under this decision, DOE will continue to rely on sites that have existing capacity to treat or dispose of LLW and MLLW (65 FR 10061). Hanford and the Nevada Test Site (NTS) were identified in the ROD to receive LLW and MLLW from other DOE sites that do not have capabilities to dispose of their wastes. The INEEL, Los Alamos National Laboratory, the ORR and the SRS would continue to dispose of LLW generated at those sites. DOE also identified Hanford, the INEEL, ORR, and SRS as regional MLLW treatment facilities that could accept waste from other sites for treatment. Those decisions generally represent a continuation of ongoing treatment and disposal activities at the identified sites and do not affect DOE's ability to send waste to commercial treatment or disposal facilities.

- **Non-Wastewater Hazardous Waste**. The hazardous waste treatment ROD (63 FR 41810) announced a DOE decision to continue to use commercial facilities for the treatment and disposal of non-wastewater hazardous waste generated at DOE sites.

- **High-Level Waste**. The HLW storage ROD determined that HLW should be stored at the generator sites pending disposal in a geologic repository (64 FR 46661).

This HSW EIS evaluates the Hanford site-specific impacts of proposed waste management operations and activities at the project level, consistent with the WM PEIS. The WM PEIS evaluated Hanford as a receiving site for both regionalized and centralized alternatives within each waste type. Therefore, the analyses for waste coming to Hanford encompassed a range of waste volumes that represented largely Hanford-generated waste in the decentralized alternatives, to larger quantities in the centralized alternatives that represented a substantial fraction of a particular waste type to be generated at DOE sites across the nation. For LLW, the waste volumes ranged from 89,000 m^3 generated at Hanford to 1,500,000 m^3 generated at Hanford as well as at other DOE sites. The corresponding

MLLW volumes were 36,000 m^3 for Hanford to 219,000 m^3 including waste from other DOE sites. The range for TRU waste was 52,000 m^3 from Hanford to 132,000 m^3 including waste from other DOE sites.

The range of waste volumes evaluated in the WM PEIS therefore encompasses the range of waste volumes considered in this HSW EIS for LLW, MLLW, and TRU waste (see Section 3.3 and Volume II, Appendixes B and C). Likewise, the environmental consequences of transporting and managing waste from other DOE sites at Hanford are expected to be similar to the impacts presented in the WM PEIS. The site-specific consequences of waste management alternatives considered in this HSW EIS are presented in Section 5 (Volume I) and the associated appendixes (Volume II). Potential mitigation measures that might be required as a result of implementing the alternatives are discussed in Section 5.18.

- **Relocation and Storage of Isotopic Heat Sources (DOE/EA-1211 June 1997)**

  In this EA, DOE proposed construction and operation of a storage site at the CWC in the 200 West Area of the Hanford Site for storage, pending future disposal decisions, of isotopic heat sources that were previously stored in the 324 Building (DOE 1997a). The material includes 34 isotopic sources: 30 sealed isotopic heat sources manufactured in the 324 Building as part of a bilateral agreement between the Federal Republic of Germany and DOE; two production demonstration canisters; and two instrumented canisters. The agreement was for developing processes for the treatment and immobilization of HLW. Subsequently, the need for the sources was eliminated and Germany and DOE entered into another agreement for the storage and disposition of the materials. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on June 6, 1997.

- **Trench 33 Widening in 218-W-5 Low Level Burial Ground (DOE/EA-1203 July 1997)**

  In this EA, DOE proposed to widen and operate the existing and unused disposal Trench 33 within the 218-W-5 LLBG in the 200 West Area for disposal of LLW (DOE 1997b). The existing V-type LLW trenches were designed before 1976 and were analyzed in a previous Environmental Statement (ERDA 1975). The widening of Trench 33 increased the disposal capacity and allowed for disposal of both boxed and large packages of Category (Cat) 1 LLW that would not efficiently fit in the existing V-type trench configuration. The proposed action provided for more cost-effective land use and increased the capacity of the LLBG without increasing the footprint. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on July 28, 1997.

- **Waste Isolation Pilot Plant Disposal Phase Final Supplemental EIS (DOE/EIS-0026-S-2 September 1997)**

- DOE prepared the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental EIS* (WIPP SEIS-II) to consider disposal of TRU waste at the WIPP (DOE 1997d). The supplement evaluated transportation methods, the disposal inventory, and the level of treatment required for

disposal or storage (repackaging to meet planning basis WIPP waste acceptance criteria, thermal treatment, or treatment by shred and grout). The Hanford Site was considered for treatment of TRU waste by any of the three methods, and for storage of TRU waste (either without disposal at WIPP or pending disposal). The ROD was issued on January 23, 1998, to dispose of Hanford and other sites' TRU waste at WIPP (63 FR 3623), after treatment to meet WIPP waste acceptance criteria. The HSW EIS provides an updated site-specific analysis of impacts from processing Hanford's TRU waste prior to its ultimate disposal at WIPP.

- **Final Hanford Comprehensive Land-Use Plan EIS (DOE/EIS-0222F September 1999)**

  DOE prepared a *Final Hanford Comprehensive Land-Use Plan EIS* (HCP EIS, formerly named *Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan*) to evaluate the potential environmental impacts associated with implementing a comprehensive land-use plan for the Hanford Site for at least the next 50 years (DOE 1999c). Working with federal, state, and local agencies and tribal governments, DOE evaluated six land-use alternatives. In the ROD for the HCP EIS, DOE decided to designate the 200 Areas for Industrial-Exclusive use and Area C for Conservation-Mining (64 FR 61615). Radioactive and hazardous waste treatment, storage, and disposal activities, as described in this HSW EIS, are consistent with the Industrial-Exclusive land use selected for the 200 Areas and use of Area C as a borrow pit consistent with the Conservation-Mining land use selected for that area in the HCP EIS decision. (See Figure 4.2 in the HSW EIS for a land-use map.)

- **Environmental Assessment for the Offsite Transportation of Certain Low-level and Mixed Radioactive Waste from the Savannah River Site for Treatment and Disposal at Commercial and Government Facilities (DOE/EA-1308 February 2001)**

  This EA was prepared to evaluate near-term offsite treatment and disposal options for LLW and MLLW because onsite treatment and disposal capabilities for these waste forms were not available at the Savannah River Site (DOE 2001d). These waste forms would comprise an estimated volume of approximately 136,057 m^3 (4,804,282 ft^3). The EA considered transport by either truck or rail to seven potential treatment or disposal facilities, including the Hanford Site. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI.

- **Environmental Assessment for Transportation of Low-level Radioactive Waste from the Oak Ridge Reservation to Off-Site Treatment or Disposal Facilities (DOE/EA-1315)**

  The EA evaluates the potential environmental impacts associated with transportation of legacy and operational LLW from the Oak Ridge Reservation in Tennessee for treatment or disposal at various locations in the United States (66 FR 64406). The proposed action was to package as needed, load, and ship existing (about 40,000 m^3 [1,410,000 ft^3]) and forecasted (about 7700 m^3/yr [271,000 ft^3/yr]) LLW from ORR to existing or future facilities at other DOE sites, including Hanford, or to licensed commercial nuclear waste treatment or disposal facilities. Transport by truck, by rail, or by inter-modal carrier (i.e., truck and rail combination) was considered. Based on analyses in the EA, DOE

determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on October 29, 2001.

- **Environmental Assessment – Disposition of Surplus Hanford Site Uranium, Hanford Site, Richland, Washington (DOE/EA-1319 June 2000)**

  An EA was prepared to assess environmental impacts associated with the disposition of surplus Hanford Site uranium (DOE 2000). DOE identified about 1865 metric tons of uranium (MTU) on the Hanford Site as surplus. Of that total, DOE decided to relocate approximately 900 MTU of potentially saleable uranium materials to DOE's Portsmouth site near Portsmouth, Ohio, for future beneficial use. The remaining materials consisted of approximately 140 MTU that were subsequently disposed of onsite, and approximately 825 MTU, which would be consolidated and stored in the 200 Areas pending final HSW EIS decisions. The materials designated for onsite management may ultimately be transferred to the Hanford Solid Waste Program for disposal in the Hanford Site LLBGs, and are included in the forecasts used to determine waste volumes in this EIS. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on June 15, 2000.

- **Environmental Assessment – Use of Existing Borrow Areas, Hanford Site, Richland, Washington (DOE/EA-1403 October 2001)**

  This EA evaluated potential environmental consequences of operating existing borrow areas at the Hanford Site to provide soil, sand, gravel, and rock for construction projects, site maintenance activities, and closure of solid waste burial sites (DOE 2001c). Although the total quantities of material necessary for final closure of the 200 Area LLBGs were not included in this EA, the locations evaluated included likely sources for these materials in the foreseeable future. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on October 10, 2001.

- **Environmental Assessment – Transuranic Waste Retrieval from the 218-W-4B and 218-W-4C Low-Level Burial Grounds, Hanford Site, Richland, Washington (DOE/EA-1405 March 2002)**

  This EA was prepared to evaluate alternatives for retrieval of about 20 percent of the suspect TRU waste volume that was retrievably stored in the LLBG trenches (DOE 2002c). The analysis updates some aspects of evaluations for TRU waste retrieval previously published in the HDW EIS (DOE 1987) and a subsequent EA (DOE 1995b). The activity would involve recovery of up to 15,200 208-L (55-gal) drums and a small number of miscellaneous other containers of suspect TRU waste buried in the 200 West Area LLBGs. The contents of each container would be evaluated and containers determined not to be TRU waste would remain in the LLBGs. Drums that contain TRU waste would ultimately be processed and certified at WRAP and shipped to WIPP for disposal.

  Environmental consequences from the proposed activity were estimated to occur mainly for workers, resulting in about 6 person-rem from direct exposure to radiation during the 5-year period of retrieval operations. No substantial emissions of chemicals or radionuclides were expected from routine

retrieval operations. Consequences of potential radiological or chemical releases from reasonably foreseeable accidents were within safety guidelines, and the number of industrial illnesses and injuries expected from the operation was small (up to 1 lost workday event). No serious or irreversible health effects to workers or members of the public were anticipated to occur from either accidents or routine operations. Because of the nature and location of the operations, other types of environmental impacts would be unlikely. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on March 22, 2002.

- **West Valley Demonstration Project Waste Management Environmental Impact Statement (DOE/EIS-0337D April 2003)**

  This EIS (DOE 2003e) describes the environmental impacts of the Department of Energy's proposed action to ship radioactive wastes that are either currently in storage, or that will be generated from operations over the next 10 years, from the West Valley Site to offsite disposal locations and to continue ongoing waste management activities at the site. Under DOE's preferred alternative, LLW and MLLW would be shipped to Hanford or the Nevada Test Site for disposal, TRU waste would be shipped to WIPP for disposal and vitrified HLW canisters would be shipped to Yucca Mountain for disposal. DOE's non-preferred alternative is the same as the preferred alternative with respect to LLW and MLLW. However, under DOE's non-preferred alternative, TRU waste and vitrified HLW could be sent to Hanford and/or other large DOE sites for interim storage until these wastes could be shipped to WIPP and Yucca Mountain, respectively.

- **Draft Supplemental Programmatic Environmental Impact Statement on Stockpile Stewardship and Management for a Modern Pit Facility (DOE/EIS-236-S2 May 2003)**

  This SEIS evaluates alternatives for production of plutonium pits, an essential component of the nation's nuclear weapons (DOE 2003a). Plutonium pits were formerly manufactured at the DOE Rocky Flats Plant, which ceased production in 1989. The *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management* evaluated alternatives for maintaining the nation's nuclear stockpile, including needs for pit manufacturing capability and capacity (DOE 1996a). As a result of the programmatic EIS, DOE decided to establish an interim pit production capability at the Los Alamos Site in New Mexico. The draft SEIS evaluated alternatives for increased pit production in the future, including expansion of the interim facility at Los Alamos, or constructing a new facility at Los Alamos, NTS, the Pantex Site in Texas, SRS in South Carolina, or the Carlsbad (WIPP) Site in New Mexico. DOE's preferred alternative identified in the draft SEIS was construction of a new facility, but neither its capacity nor location was specified. Estimated annual waste production at the new facility would range from 590 to 1,130 m^3 of TRU waste, 2,070 to 5,030 m^3 of LLW, and 1.7 to 4.2 m^3 of MLLW. Hanford was not considered as an alternative for siting the new pit production facility, but could potentially receive waste generated at the new facility under some alternatives where the primary site does not have the capability to manage such waste.

- **Environmental Assessment for the Accelerated Tank Closure Demonstration Project (DOE/EA-1462 June 2003)**

  This EA was prepared for a project that would collect engineering and technical information to support preparation of the proposed Tank Closure EIS by a demonstration of closure activities for Single-Shell Tank 241-C-106 located in the 241-C Tank Farm (DOE 2003c). Activities associated with this Accelerated Tank Closure Demonstration project include stabilization of residual tank waste. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI on June 16, 2003.

- **Environmental Assessment. Deactivation of the Plutonium Finishing Plant, Hanford Site, Richland, Washington (DOE/EA-1469, September 2003)**

  This EA describes activities and impacts related to deactivation of the Plutonium Finishing Plant complex (DOE 2003b). The principal actions evaluated include: 1) removing residual nuclear material inventory (approximately 100 kilograms [220 pounds]) present in the major buildings and other systems and structures within the PFP complex and 2) deactivation of the PFP complex. The projected end state of the PFP complex at completion of these activities would consist of deactivated structures (i.e., exterior walls, roofs, foundations and substructures) requiring minimal surveillance and maintenance before dismantlement. LLW, MLLW, and TRU waste generated by these activities could be transferred to the solid waste program for management. Based on analyses in the EA, DOE determined the proposed action was not a major federal action significantly affecting the quality of the human environment and issued a FONSI in October 2003.

1.5.3 Related State Environmental Policy Act (SEPA) Documents

This section describes non-DOE documents for facilities that may be used as part of the overall Solid Waste Program for management of Hanford Site LLW and MLLW.

- **Draft Environmental Impact Statement. Commercial Low-Level Radioactive Waste Disposal Site, Richland, Washington, Washington State Department of Health (WDOH) and Washington State Department of Ecology (August 2000)**

  WDOH and Ecology (2000) evaluated potential environmental consequences of operating a commercial LLW disposal facility located near the Hanford Site 200 East Area. The EIS evaluated renewal of the facility's operating license, establishing an upper limit on disposal rate for some types of LLW, and approval of the site stabilization and closure plan. The Hanford Site could dispose of some LLW at commercial facilities if there were cost or environmental benefits to using non-DOE disposal capacity. The final SEPA EIS had not been issued at the time of publication of the final HSW EIS.

- **Environmental Impact Statement for Treatment of Low-Level Mixed Waste, City of Richland (February 1998)**

  The City of Richland, Washington, published a final SEPA EIS (City of Richland 1998) for operation of a MLLW treatment facility by ATG. The EIS analyzed impacts of construction and operation of the facility in Richland for treatment of MLLW from federal and private customers, including Hanford and potentially other DOE sites. The consequences of treating limited quantities of Hanford MLLW at this facility were also evaluated separately (DOE 1998, 1999a).

1.5.4 Related CERCLA Documents

- **Record of Decision. U.S. DOE Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington (January 1995)**

  DOE and EPA decided to construct the Environmental Restoration Disposal Facility to dispose of radioactive and mixed waste from cleanup of the Hanford Site (DOE, EPA, and Ecology 1995). The ROD was subsequently amended to expand the facility (DOE, EPA, and Ecology 1997) and to delist the leachate collected at the facility (DOE, EPA, and Ecology 1999).

- **Record of Decision, U.S. Department of Energy, Hanford 300 Area, Hanford Site, Benton County, Washington (April 2001)**

  DOE, EPA, and Ecology decided that interim remedial actions for portions of the 300 Area would include removal of contaminated soil, structures, and associated debris; treatment, if needed, to meet waste acceptance criteria at an acceptable disposal facility; disposal of contaminated materials at ERDF, WIPP, and other EPA-approved disposal facilities; recontouring and backfilling excavated areas followed by infiltration control measures; institutional controls to ensure that unanticipated changes in land use that could result in unacceptable exposures to residual concentration do not occur; ongoing groundwater and ecological monitoring to ensure effectiveness of remedial actions; and the regulatory framework for accelerating future remediation decisions (EPA 2001). The cleanup plan and schedules would include specific commitments regarding the decontamination and decommissioning of facilities and aboveground structures needed to complete cleanup of underlying waste sites in the 300 Area Complex and the remediation plans for the 618-10 and 618-11 Burial Grounds.

1.6 NEPA Process for the HSW EIS

The formal NEPA process for preparing the HSW EIS is described in the following sections. The typical process begins with DOE issuing a Notice of Intent (NOI) to prepare an EIS, followed by the scoping period, during which public input is sought on the scope of the EIS. The draft EIS is prepared following the scoping period, and the draft is issued for public comment. EPA publishes a *Federal Register* Notice of Availability (NOA) for the draft EIS at the beginning of the public comment period, which lasts a minimum of 45 days. Following public comment on the draft, the final EIS is prepared,

ultimately leading to a Record of Decision on the proposed action. The ROD is published no sooner than 30 days after the EPA Notice of Availability for the final EIS, after which DOE may proceed with the activity under consideration.

1.6.1 Scoping for the Draft HSW EIS

The scope of an EIS consists of the range of actions, alternatives, and impacts to be considered (40 CFR 1508.25). Scoping is a public process used by DOE to help identify significant issues related to a proposed action. As part of that process, DOE invited comments and recommendations from interested parties on the scope of this HSW EIS.

DOE decided to prepare the HSW EIS in early 1997, following publication of the draft WM PEIS, but before DOE issued the final WM PEIS in May of 1997. The formal Notice of Intent to prepare the HSW EIS was published in the October 27, 1997 *Federal Register* (62 FR 55615), in accordance with applicable NEPA regulations. The NOI announced the schedule for the public scoping process and summarized the proposed alternatives and environmental consequences to be considered in the EIS.

- **Public Comment Period –** Originally scheduled from October 27, 1997 through December 11, 1997, the comment period was extended to 95 days by DOE through January 30, 1998, in response to a request from the State of Oregon. The Notice of Extension appeared in the December 11, 1997, *Federal Register* (62 FR 65254).

- **Public Scoping Meetings –** Scoping meetings were held in Richland, Washington, on November 12, 1997, followed by a meeting in Pendleton, Oregon, on November 13, 1997. Opportunities were provided at each meeting for informal discussion, as well as formal comments, about the DOE proposed action and the scope and content of the HSW EIS.

- **Scoping Results –** Both oral and written comments were received at the public scoping meetings. Written comments were also accepted by conventional and electronic mail. All written and oral comments were considered in preparing the draft HSW EIS. Commenters provided comments on several topics: relationship to other NEPA documents and DOE activities, alternatives and activities to analyze, waste types and volumes to analyze, environmental consequences, and public involvement and government agency consultation. During preparation of the draft HSW EIS the nature of the alternatives evolved as a result of the scoping comments and publication of the WM PEIS RODs. A summary of the scoping comments and the DOE responses is included in Volume II, Appendix A of this HSW EIS.

1.6.2 Publication of the First Draft HSW EIS

The first draft HSW EIS was approved by DOE in April 2002 (DOE 2002b), and the EPA Notice of Availability was published on May 24, 2002 (67 FR 36592). The scope of the first draft HSW EIS included storage, treatment, and disposal of LLW and MLLW (including WTP melters) at Hanford, and processing and certification of TRU waste for disposal at WIPP. The scope of transportation analysis included shipment of onsite and offsite generated waste within the Hanford Site boundary, and shipment

of some MLLW to offsite facilities for treatment and return to Hanford. Most offsite transportation of LLW, MLLW, and TRU waste to Hanford was evaluated in the WM PEIS and the WIPP SEIS-II (DOE 1997c, 1997d), and those evaluations were referenced in the first draft HSW EIS.

1.6.3 Public Comments on the First Draft HSW EIS

The public comment period for the first draft HSW EIS extended for 90 days from publication of the NOA on May 24, 2002 through August 22, 2002. Approximately 3800 comments were received from 700 individuals, organizations, or agencies via mail, electronic mail, and at public meetings. A total of six public meetings were held in Richland and Seattle, Washington, on August 6 and 7, respectively; and in LaGrande and Hood River, Oregon on July 23, and August 14, 2002, respectively. Two meetings were held in Portland, Oregon on July 30 and August 21, 2002. The public meetings provided opportunity for informal discussion before the meeting, a brief DOE presentation on the draft HSW EIS, presentations by regulatory agencies and local interest groups, and a question-and-answer session, in addition to the formal public comments. Forms for submitting written comments were also available at each meeting. Each comment was considered in preparing the revised draft HSW EIS, and many comments resulted in changes to the document.

Comments on the first draft HSW EIS generally were related to the following major issues:

- DOE's role in Hanford cleanup
- NEPA process: a number of comments questioned whether the HSW EIS complied with all NEPA requirements
- integration with other DOE programs and NEPA decisions: comments expressed concern that the HSW EIS be consistent with recent DOE proposals to accelerate cleanup at DOE sites and with recent NEPA decisions
- public involvement process: comments questioned the procedures used to notify members of the public about hearings on the draft HSW EIS, as well as the meeting process itself
- scope of transportation analysis: comments questioned the appropriateness of the WM PEIS transportation analysis and the decision not to repeat that nationwide analysis in the HSW EIS
- technical content and scope of the HSW EIS: comments 1) pointed out perceived omissions or inaccuracies in the HSW EIS technical analyses, alternatives, and scope of the EIS, and 2) requested evaluation of additional alternatives for waste treatment and disposal
- disposal facility design and long-term performance: there were numerous concerns regarding use of unlined trenches for disposal of LLW, as well as concerns about contamination of groundwater and the Columbia River

- importation of offsite waste to Hanford: comments expressed concern regarding the impact of additional offsite waste on the Hanford Site environment, as well as on other cleanup activities at Hanford.

An overview of the way in which DOE addressed each major issue, and the responses to specific comments received on the first draft HSW EIS, were included in the comment response volume (Volume III) of the revised draft HSW EIS.

1.6.4 Scoping for the ILAW Disposal SEIS

DOE prepared the TWRS EIS (DOE and Ecology 1996) to evaluate disposition of Hanford's high-level tank waste, as noted previously. As part of the TWRS EIS ROD (62 FR 8693), DOE planned to place ILAW into concrete vaults in the 200 East Area. DOE subsequently began to examine alternative plans for disposing of ILAW in onsite near-surface facilities. Following a supplement analysis of disposal options for ILAW (DOE 2001g), DOE decided additional NEPA review was required, and a Notice of Intent to prepare a SEIS was issued on July 8, 2002 (67 FR 45104). Alternatives under consideration included the following:

- Change ILAW from a vitrified cullet form (granular glass particles similar to pea gravel) to a monolithic (single large) vitrified waste form in canisters.

- Change interim retrievable storage of ILAW in vaults to disposal in near-surface regulatory-compliant trenches of various configurations.

- Consider ILAW disposal at other potential sites within the 200 East and 200 West Areas.

The proposed changes were intended to be more cost effective and efficient with respect to land and other resource use. Worker safety and compatibility of the ILAW form with the engineered facility were also considerations.

Following the Notice of Intent to prepare the ILAW disposal SEIS, DOE held a scoping meeting in Richland, Washington, on August 20, 2002, and received oral and written comments during the 49-day scoping period. During scoping and preparation of a working draft SEIS, meetings were held in Seattle, Washington and Portland, Oregon. In addition, meetings were held with the Yakama Nation, Hanford Communities, Hanford Natural Resource Trustee Council, Oregon Office of Energy, and the Hanford Advisory Board. The scoping comments and questions centered on the following major themes:

- requests for technical information and clarification
- ILAW disposal alternatives
- long-term performance, mitigation, and stewardship
- ILAW form and treatment alternatives
- cumulative impacts
- regulatory, legal, and NEPA issues

- waste classification, definition of ILAW and HLW
- other impacts and analyses
- relationship to the HSW EIS and other NEPA documents
- public involvement process
- relationship to current DOE cleanup plans
- Native American treaty issues
- opposition to disposal or storage of ILAW at Hanford.

Appendix A in Volume II of this HSW EIS contains a summary of comments received on the scope of the ILAW SEIS. After scoping for the ILAW disposal SEIS, DOE decided to address ILAW disposal alternatives in the revised draft HSW EIS, and therefore terminated its preparation of the ILAW SEIS (68 FR 7110). The HSW EIS provides a NEPA review for ILAW disposal in addition to Solid Waste Program operations evaluated in the first draft HSW EIS (DOE 2002b).

1.6.5 Revised Draft HSW EIS

The revised draft HSW EIS (DOE 2003d) was distributed for review and comment to the general public, members of Congress, appropriate federal agencies, interested governmental organizations, and affected state, tribal, and local governments. Stakeholders were notified of the upcoming publication of the HSW EIS, and were given the opportunity to request the document in several formats. The entire document was distributed as required or upon request. Other individuals who had requested the first draft HSW EIS or who requested the revised draft were provided a summary of the revised draft EIS with the complete document on compact disk. The revised draft HSW EIS addressed new waste management alternatives that had been developed since the first draft HSW EIS was issued in April 2002 (DOE 2002b). The alternatives were developed after review of the Hanford Site Performance Management Plan prepared in August 2002 (DOE-RL 2002b), discussions with regulatory agencies and stakeholders (DOE-RL 2002a), and in response to public comments. It also incorporated alternatives for onsite disposal of ILAW, as discussed in the previous section. In response to requests for additional information regarding offsite transportation risks, the revised draft HSW EIS included an expanded discussion of transportation consequences based on the analyses in the WM PEIS and the WIPP SEIS-II. Expanded analyses included evaluation of waste from Hanford generators to clearly distinguish the incremental impacts of importing various quantities of waste from other DOE sites.

Because of the substantial changes relative to the first draft HSW EIS, DOE elected to issue the revised draft for public comment. The public involvement process was similar to that for the first draft HSW EIS. The revised draft HSW EIS was approved by DOE in March 2003, and the EPA Notice of Availability was issued on April 11, 2003 (68 FR 17801). The public review period for the revised draft was initially scheduled to close on May 27, 2003 but was extended to 62 days, ending on June 11, 2003 (68 FR 28821, 68 FR 32486). In addition to soliciting written comments, DOE held public hearings to receive oral and written comments on the revised draft HSW EIS. Meetings were held in Richland, Spokane, and Seattle, Washington, on May 1, 7, and 15, respectively; and in LaGrande, Portland, and Hood River, Oregon, on May 12-14. The schedule for public review and hearings was announced in local media and by direct mailing to stakeholders.

Issues raised during public review of the revised draft HSW EIS were similar to those expressed during review of the first draft: concerns about importing waste to Hanford from offsite facilities; transportation risks, contamination of soil and groundwater, waste disposal impacts on human health and the environment; and specific points regarding assumptions and methods used for various impact analyses. Because the scope of the HSW EIS was expanded to include disposal of ILAW, additional issues regarding Hanford tank waste treatment were raised, including classification of LAW for onsite disposal, pretreatment of tank waste to remove technetium-99, alternative treatment technologies for LAW, and other issues related to closure of the tanks. Public involvement concerns were also expressed, including several requests for extension of the public comment period for the revised draft. The comment response document (Volume III of this final HSW EIS) presents DOE responses to these comments. Written comments and public meeting transcripts are reproduced in Volume IV of this EIS.

1.6.6 Preparation of the Final HSW EIS and Record(s) of Decision

Following the public comment period and after considering the comments received on the revised draft HSW EIS, DOE prepared this final HSW EIS. DOE considered all comments received during the public comment period on the revised draft HSW EIS, which are addressed in the Comment Response Document (Volume III). A number of commenters on the revised draft HSW EIS requested that DOE make changes or provide additional information, and DOE did so where appropriate. These revisions are not a result of any significant new circumstances or information that became available since publication of the revised draft HSW EIS. For example, DOE provided additional details on the relationship between the HSW EIS and other NEPA documents, including the Waste Management Programmatic EIS and the West Valley Demonstration Project Waste Management EIS; the analysis of the impacts of offsite waste (including an updated transportation analysis); evaluation of long-term performance, particularly with respect to the groundwater; and DOE's approach to, and analysis of, cumulative impacts. As a result, this final HSW EIS incorporates various changes to discussions that appeared in the revised draft HSW EIS, and it provides additional details and supplemental analyses concerning potential environmental impacts. Throughout Volumes I and II of this final HSW EIS, DOE has indicated these changes with "change bars" in the margins of the affected pages. The final HSW EIS has been distributed to individuals and organizations that received the revised draft HSW EIS and to others upon request.

No sooner than 30 days after the EPA Notice of Availability for the final HSW EIS is published in the *Federal Register*, DOE may issue one or more RODs for actions described in the final HSW EIS. In addition to the environmental consequences described in this final HSW EIS, DOE may evaluate other issues such as cost, programmatic considerations, and national needs in making its decisions.

If mitigation measures, monitoring, or other conditions are adopted as part of a DOE decision, they will be summarized in the ROD(s), if applicable, and a mitigation action plan will be prepared. The ROD(s) and mitigation action plan, if needed, will be placed in the DOE Reading Room in Washington, D.C., and in the DOE Public Reading Room at Washington State University, Tri-Cities Campus, in Richland, Washington. They will also be available to interested parties upon request.

1.7 Scope of the HSW EIS

This HSW EIS addresses proposed actions and alternatives for managing four major waste types: LLW, MLLW, TRU waste, and ILAW. It updates previous Hanford NEPA reviews to incorporate alternatives developed after those reviews were completed, and evaluates or updates assessments of site-specific impacts at Hanford associated with activities described in the WM PEIS (DOE 1997c). Hanford waste management operations include the three major functions of storage, treatment, and disposal. Alternatives evaluated in this EIS address continued operation and expansion of ongoing waste management operations to accommodate future waste receipts. A range of waste volumes is evaluated for each alternative in order to encompass the quantities of waste that might be received at Hanford for management in the future.

1.7.1 Waste Types Evaluated in the HSW EIS

The types of waste evaluated in the HSW EIS are described in the following sections. Descriptions of the specific waste streams within each waste type and their management alternatives at Hanford are presented in Section 2 and Section 3, respectively. Throughout the HSW EIS, the LLW, MLLW, TRU waste, ILAW, and WTP melters that are evaluated within the scope of the document are referred to collectively as Hanford solid waste (HSW). This designation is not meant to be all-inclusive of various wastes present at Hanford, but is used as a convenience in describing the impacts of the wastes considered in this document relative to other types of waste and activities at the Hanford Site.

1.7.1.1 Low-Level Waste

LLW is waste that contains radioactive material and that does not fall under any other DOE classification of radioactive waste. DOE manages LLW and other radioactive waste under the authority of the Atomic Energy Act (AEA) of 1954 (42 USC 2011). At Hanford, LLW may be further divided into Category 1 (Cat 1), Category 3 (Cat 3), or greater than Category 3 (GTC3) LLW, depending on the specific characteristics and quantities of radioactive material that it contains, as defined in the *Hanford Site Solid Waste Acceptance Criteria* (HSSWAC) (FH 2003). LLW streams managed at Hanford are described in Section 2.1.1.

LLW and other radioactive wastes are also classified as either contact-handled (CH) or remote-handled (RH), depending on radiation dose rates as measured in contact with the container surface.

Contact-Handled (CH) and Remote-Handled (RH) Waste

Contact-handled waste containers produce radiation dose rates less than or equal to 200 millirem/hour at the container surface. RH waste containers produce dose rates greater than 200 millirem/hour. CH containers can be safely handled by direct contact using appropriate health and safety measures. RH containers require special handling or shielding during waste management operations. These designations can apply to LLW, MLLW, TRU waste, and ILAW.

1.7.1.2 Mixed Low-Level Waste

MLLW is LLW that also contains hazardous components as defined by the Resource Conservation and Recovery Act (RCRA) of 1976 (42 USC 6901) and applicable state regulations. Hazardous waste requirements became applicable to DOE waste in 1987. The hazardous components of MLLW are regulated under applicable RCRA or state regulations (40 CFR 260-280; WAC 173-303). The radioactive components of MLLW are regulated by DOE under the AEA (42 USC 2011). MLLW streams managed at Hanford are described in Section 2.1.2. Additional discussion of regulations for managing radioactive and hazardous wastes at Hanford is provided in Section 6.

1.7.1.3 Transuranic Waste

TRU waste contains greater than specified quantities of TRU radionuclides as defined in Section 2.1.3. Mixed TRU waste also contains non-radioactive hazardous constituents. The radioactive components of all TRU waste are regulated under the AEA (42 USC 2011). The hazardous constituents in TRU waste are regulated under applicable RCRA or state regulations (40 CFR 260-280; WAC 173-303). TRU waste must be characterized, packaged, and certified as meeting the WIPP waste acceptance criteria before it can be shipped to that facility for disposal.

TRU waste was not defined as a separate waste type until 1970. From 1970 through 1988, waste suspected of containing TRU radionuclides was retrievably stored in the Hanford LLBGs. This waste is referred to as suspect TRU waste because only part of the stored waste contains TRU radionuclides at concentrations specified in the current definition for TRU waste. Since 1988, TRU waste has generally been stored in surface facilities until it can be processed and certified for disposal at WIPP.

DOE previously decided to characterize the retrievably stored waste and recover the containers that are determined to contain TRU waste for processing and shipment to WIPP (DOE 1987). DOE plans to characterize the retrievably stored waste to determine which containers should be processed as TRU waste (DOE 2002c). TRU waste managed by the Hanford Solid Waste Program is described in Section 2.1.3.

1.7.1.4 Immobilized Low-Activity Waste and Melters from the Hanford Tank Waste Treatment Plant

For purposes of analysis in this HSW EIS, ILAW and melters from the WTP are assumed to be managed and disposed of as RH MLLW. The first draft HSW EIS evaluated disposal of the WTP melters as part of the pretreated MLLW waste stream, but did not address disposal of ILAW. In the revised draft and this final EIS, the WTP melters and ILAW are evaluated separately from other MLLW because the physical requirements for onsite transport, handling, and disposal differ from those typically used for most routine operational LLW and MLLW.

Hanford tank waste is presently considered mixed waste from a regulatory perspective. Based on the *Remote-Handled Immobilized Low-Activity Waste Disposal Facility Environmental Permits and Approval Plan* (Deffenbaugh 2000), the recommended approach for ILAW disposal in this document would be to

follow the normal state and RCRA permitting process. However, there are other regulatory processes that could allow DOE to dispose of ILAW consistent with RCRA requirements, including petitioning for variance, rulemaking, and/or delisting.

1.7.2 Waste Volumes Evaluated in the HSW EIS

Unless stated otherwise, environmental consequences in the HSW EIS have been evaluated for three waste volumes: a Hanford Only, a Lower Bound, and an Upper Bound waste volume. Because of uncertainty about future waste receipts, these alternative waste volume scenarios were evaluated to encompass the range of quantities that might be received.

- The **Hanford Only** waste volume consists of 1) the forecast volumes of LLW, MLLW, and TRU waste from Hanford Site generators, 2) the forecast ILAW and WTP melter volumes from treatment of Hanford tank waste, and 3) existing onsite inventories of waste that are already in storage. The analysis also includes waste that has previously been disposed of in the LLBGs.

- The **Lower Bound** waste volume consists of 1) the Hanford Only volume, and 2) additional volumes of LLW and MLLW that are currently forecast for shipment to Hanford from offsite facilities. The Lower Bound volume for TRU waste is not substantially greater than the Hanford Only volume, and is not analyzed separately in all cases.

- The **Upper Bound** waste volume consists of 1) the Lower Bound volume, and 2) estimates of additional LLW, MLLW, and TRU waste volumes that may be received from offsite generators consistent with the WM PEIS decisions.

The first draft HSW EIS evaluated consequences for the Lower and Upper Bound waste volumes. The Hanford Only waste volume was included in the revised draft HSW EIS and this final EIS so the incremental impacts of managing all offsite waste can be clearly evaluated. The bases for waste volumes evaluated in the HSW EIS are discussed further in Section 3.3 and Volume II, Appendix C.

1.7.3 Hanford Waste Management Alternatives Evaluated in the HSW EIS

This HSW EIS considers a range of reasonable alternatives for management of solid LLW, MLLW, TRU waste, WTP melters, and ILAW at the Hanford Site to support DOE decisions regarding management of these wastes. The waste management alternatives included within the scope of this HSW EIS are described briefly in the following sections. Hanford Solid Waste Program activities include storage, treatment, and disposal of LLW and MLLW, as well as storage, processing, and certification of TRU waste for shipment to WIPP. The HSW EIS also evaluates alternatives for onsite disposal of ILAW and melters from the WTP. In its ROD(s), DOE could choose to implement a combination of actions from any of the alternatives evaluated in this EIS. Existing and proposed waste management facilities considered in the HSW EIS alternatives are described in Section 2.2. The action and no action alternatives for managing these wastes are described further in Section 3.1. In this EIS, the no action alternative consists of continuing ongoing activities, but does not include development of new capabilities to manage wastes that cannot currently be disposed of.

1.7.3.1 Storage

Waste is generally stored while awaiting treatment or disposal. The specific storage methods used depend on the chemical and physical characteristics of the waste as well as the type and concentration of radionuclides in the waste.

In most cases, alternatives for storage of LLW, MLLW, and TRU waste consist of using existing or planned capabilities at the Central Waste Complex (CWC), T Plant, the LLBGs, or other onsite facilities. Except for the No Action Alternative, additional storage capacity is not expected to be necessary to accommodate future waste receipts. As waste in storage is treated, processed, or certified for disposal, space would become available for storage of newly received waste. The consequences of operating storage facilities needed to manage Hanford solid waste are included in the HSW EIS to provide a complete assessment and to bound the potential impacts associated with the proposed action. Conservative assumptions are used to provide flexibility in the event of future minor revisions to facility activities.

In the No Action Alternative, treatment and processing capabilities would not be available for all waste types, and any wastes that could not be disposed of would require storage. The analysis in this EIS assumes expansion of the CWC to accommodate most untreated LLW, MLLW, and TRU waste, and WTP melters and treated MLLW that exceeds existing disposal capacity. The No Action Alternative for ILAW includes construction of concrete vaults in the 200 East Area for interim storage consistent with the TWRS EIS ROD (62 FR 8693).

1.7.3.2 Treatment

Treatment action alternatives examined in this HSW EIS are shown in Figure 1.5. These alternatives apply two different approaches to processing wastes for disposal.

- **The first approach** would maximize the use of offsite treatment and develop additional onsite capacity to treat waste that could not be accepted at offsite facilities. The alternatives that would maximize use of offsite treatment would include actions DOE previously identified as the preferred alternative for treatment of LLW, MLLW, and TRU waste in the previous drafts of the HSW EIS. In general, those actions are expected to minimize environmental impacts by using or modifying existing onsite and offsite facilities for treatment, processing, and certification of waste. Non-conforming LLW would be treated to comply with the HSSWAC at offsite commercial facilities if treatment capacity does not exist at Hanford. DOE would establish additional contracts with a permitted commercial facility (or facilities) to treat most of Hanford's CH MLLW using both thermal and non-thermal processes. For MLLW and TRU waste that cannot be treated at existing facilities, such as RH or non-standard items, DOE would develop new onsite treatment capacity by modifying facilities in the T Plant Complex.

- **The second approach** for acquiring new treatment capacity would maximize the use of onsite treatment capabilities. Under this approach, the alternatives include activities that maximize treatment of MLLW and non-conforming LLW onsite at Hanford. These alternatives are expected to result in the maximum environmental impacts for operations because they include more onsite

activities and construction of a new onsite facility (or facilities) to process some LLW, MLLW and TRU waste. The new waste processing facility would be used to treat non-conforming LLW to comply with the HSSWAC if treatment capacity does not currently exist at Hanford. Except for the limited quantities treated under existing commercial contracts, most of Hanford's CH MLLW would be treated at a new facility using non-thermal processes (including alternatives to thermal processing for some wastes). The new facility would also be used to process MLLW and TRU waste that cannot be accepted at existing facilities, such as RH or non-standard items.

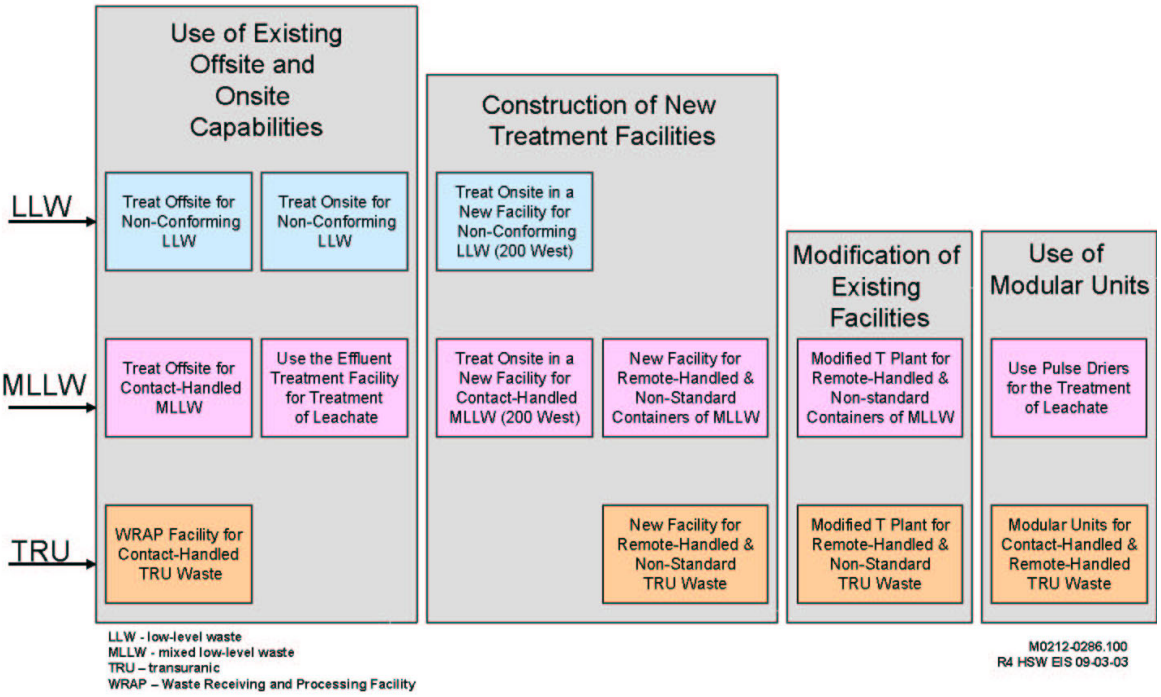

Figure 1.5. Treatment Action Alternatives (ILAW treatment alternatives are evaluated under the TWRS EIS [DOE and Ecology 1996])

In the No Action Alternative, only existing capacity for waste treatment would be used. Some non-conforming LLW, untreated MLLW, and TRU waste that cannot be processed or certified at WRAP would not be suitable for disposal, and those wastes would be stored onsite.

1.7.3.3 Disposal

The final step in the waste management process is disposal. Some types of radioactive and mixed waste can be disposed of safely in existing facilities using conventional methods such as near-surface disposal. Other types of waste require facilities that provide long-term isolation, such as a repository. Disposal facilities at Hanford accept waste suitable for near-surface disposal. Any waste from Hanford or other facilities that requires long-term isolation would ultimately be sent to a repository such as WIPP or

Yucca Mountain. This EIS evaluates alternatives or updates previous plans for permanent disposal of LLW, MLLW, ILAW, and WTP melters at Hanford, including expansion, possible reconfiguration, and closure of onsite disposal facilities.

Alternatives for Waste Disposal. Alternatives in this HSW EIS assume continued use of disposal capabilities that currently exist at Hanford until new disposal capacity can be developed and permitted. DOE would construct additional disposal capacity for LLW and MLLW. New disposal facilities would also be constructed to receive ILAW and WTP melters based on the schedule for startup and operation of the WTP. All disposal facilities would meet applicable state and federal requirements. Facilities for disposal of MLLW, ILAW, and WTP melters would be constructed to applicable regulatory standards with double liners and leachate collection systems. LLW disposal in either lined or unlined trenches is evaluated in various alternatives. By the end of operations, all disposal facilities would be closed by applying a regulatory-compliant cap to reduce water infiltration and the potential for intrusion.

Several different configurations and locations are evaluated for new disposal facilities needed to manage each waste type. The disposal action alternatives are shown in Figure 1.6. Section 3 contains a description of these disposal alternatives as evaluated in the HSW EIS. An overview of the configuration and location alternatives is as follows:

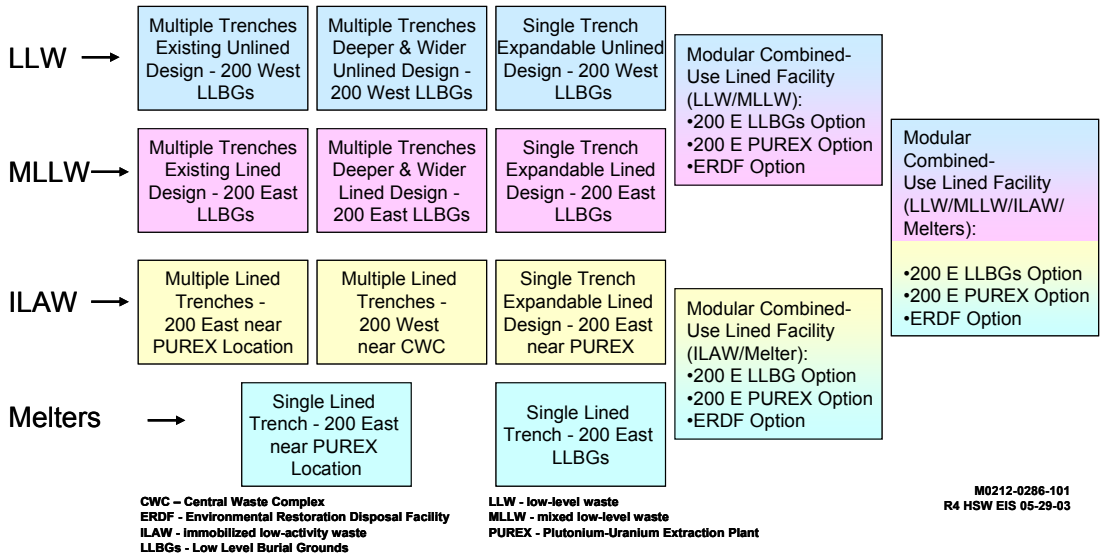

Figure 1.6. Disposal Action Alternatives

- **Disposal Configuration Alternatives**: Alternatives for disposal configuration include various options for the number and size of trenches, including facilities dedicated to a single type of waste and options for combined disposal of two or more waste types. Alternatives for segregated disposal of LLW or MLLW consist of multiple trenches similar to those currently employed for each waste type, multiple trenches of a deeper and wider configuration, or a single expandable trench for each waste type. Similarly, ILAW disposal is evaluated using multiple trenches or a single expandable

trench. The independent disposal alternative for WTP melters considers a single dedicated trench because of their relatively small overall volume, and because of constraints imposed by the size and weight of individual waste packages.

Alternatives for combined disposal of two or more waste types are also evaluated. The HSW EIS considers alternatives that include two combined-use disposal facilities: one for combined disposal of LLW and MLLW, and one for combined disposal of ILAW and WTP melters. In addition, disposal of all waste types in a single combined-use facility is evaluated. Disposal in combined-use facilities might involve construction of separate modules for wastes with different characteristics, to ensure that wastes placed in the same module are suitable for disposal together and are compatible with the engineered disposal system.

- **Disposal Location Alternatives**: The HSW EIS disposal alternatives consider several different locations for new or expanded disposal facilities, including use of LLBGs in the 200 West and 200 East Areas. New disposal sites in the 200 West Area near the CWC and in the 200 East Area near the PUREX Facility are also evaluated. Some alternatives involving combined-use disposal facilities evaluated the use of ERDF. However, such an arrangement would require modifications to the ERDF waste acceptance criteria, as well as to conditions specified in the TPA. A revision to the CERCLA ROD for ERDF might also be necessary.

In the No Action Alternative, LLW would continue to be disposed of in LLBG trenches of a design currently employed. The trenches would be backfilled but would not be capped. The two existing MLLW trenches would be filled to capacity and capped in accordance with applicable regulations. MLLW that exceeds the trench capacity, including WTP melters, would be stored onsite. ILAW would be placed in concrete vaults in the 200 East Area, consistent with the TWRS EIS ROD (62 FR 8693).

1.7.3.4 Grouping of Alternatives

In developing the alternatives for this HSW EIS, there are a large number of combinations of the various waste streams, their potential waste volumes, and individual options for their storage, treatment, and disposal. To facilitate the analysis and presentation of impacts, these alternatives and options were combined into five primary alternative groups. Alternatives for the treatment, storage, and disposal of the different waste types were included in each alternative group, in addition to a range of potential waste volumes. The alternative groups have been identified as A, B, C, D, and E. A No Action Alternative was also evaluated as required under NEPA. For Alternative Groups D and E, several different potential locations were evaluated for the disposal facility(s) within the 200 East and 200 West Areas. With the exception of the No Action Alternative, each alternative is consistent with WM PEIS RODs. For LLW, MLLW, and TRU wastes, Alternative Group A, Alternative Group B, and the No Action Alternative are fundamentally the same as Alternative 1, Alternative 2, and the No Action Alternative, described in the first draft of this HSW EIS (DOE 2002b). Alternative Groups C, D, and E (and their options) were added in the revised draft HSW EIS (DOE 2003d). The structure of the alternative groups remains the same in this final EIS. Figure 1.7 illustrates the alternatives included in each of these alternative groups.

No Action Alternative. The No Action Alternative consists of continuing current solid waste management practices, including continued storage of radioactive wastes that cannot be processed for disposal. As part of the No Action Alternative, RODs and other NEPA decisions for existing facilities and operations would be implemented and ongoing activities would continue, consistent with the Council on Environmental Quality guidelines. This is the "no action" alternative for an ongoing activity, where the EIS assumes there is no change from existing operations. For example, Hanford would continue to dispose of LLW and some MLLW within the Low Level Burial Grounds, and to certify and ship CH TRU waste to WIPP.

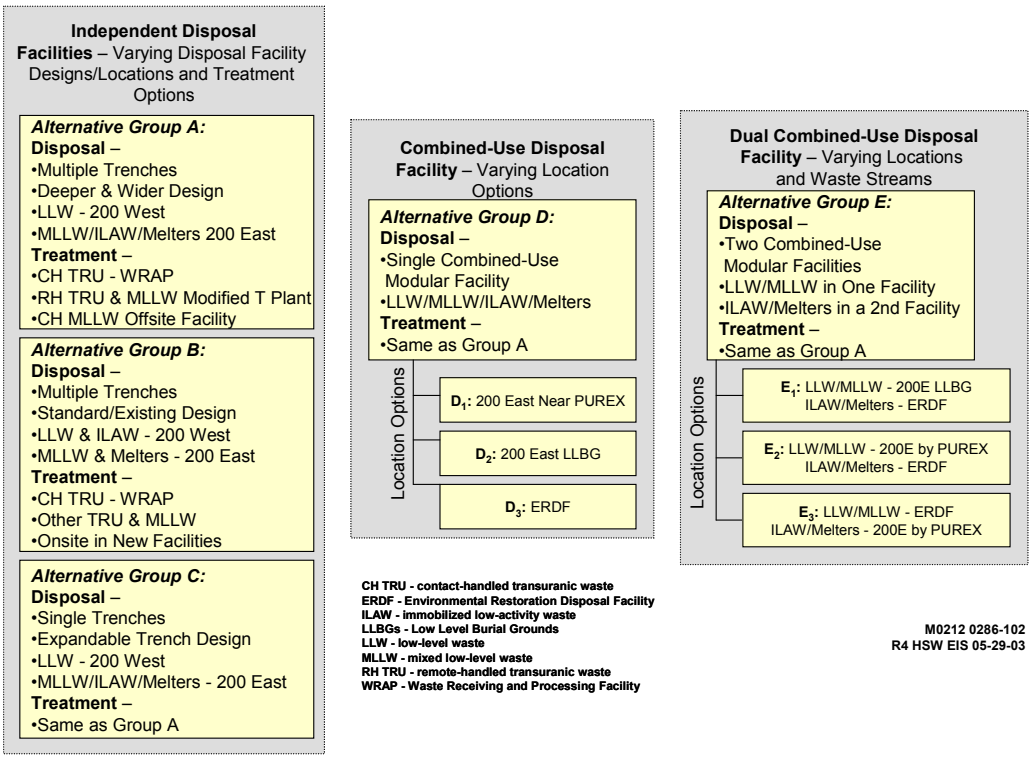

Figure 1.7. Development of Alternative Groups

Two other variations of the No Action Alternative are discussed within the context of this document. A "Stop Action" scenario is described, in which ongoing waste management operations would cease. This scenario was not considered reasonable and was therefore not evaluated in detail (See Section 3.2.4). In addition, a scenario in which waste disposal at Hanford is discontinued, but other ongoing waste management activities proceed,, is discussed and evaluated in Volume II, Appendix M.

Action Alternatives. The action alternative groups as formulated for analysis in this EIS are described in the following sections. All of the action alternatives assume continued use of existing waste management capabilities and facilities, such as the use of WRAP to process and certify CH TRU waste and use of existing disposal capacity until new disposal facilities can be designed, permitted, and

constructed. Alternatives for development of new waste management capabilities needed at Hanford are encompassed within the alternative groups described in this section.

Alternative Group A – ***Disposal by Waste Type in Larger Disposal Facilities – Onsite and Offsite Treatment***: New LLW and MLLW disposal trenches would be deeper and wider than those currently in use. New LLW disposal capacity would be located in the 200 West Area and new MLLW, ILAW, and WTP melter disposal facilities would be located in the 200 East Area. T Plant would be modified to provide processing and treatment capabilities for remote-handled TRU waste, remote-handled MLLW, and waste in non-standard containers. Treatment of most contact-handled MLLW in standard containers would be provided at offsite facilities. Operations at WRAP would continue to process contact-handled TRU waste for disposal at WIPP. Mobile processing facilities (Accelerated Process Lines, or APLs) would also be used for processing and certification of TRU waste to accelerate preparation of the waste for disposal at WIPP.

Alternative Group B – ***Disposal by Waste Type in Existing Design Disposal Trenches – Onsite Treatment***: Disposal trenches for LLW and MLLW would be of the same design as those currently in use. New LLW and ILAW trenches would be located in the 200 West Area and new MLLW and WTP melter trenches would be located in the 200 East Area. A New Waste Processing Facility would be built to provide processing and treatment capabilities for remote-handled TRU waste, remote-handled and contact-handled MLLW, and waste in non-standard containers. Operations at WRAP would continue to process contact-handled TRU waste for disposal at WIPP. Mobile processing facilities (APLs) would also be used for processing and certification of TRU waste to accelerate preparation of the waste for disposal at WIPP.

Alternative Group C – ***Disposal by Waste Type in Expandable Design Facility – Onsite and Offsite Treatment***: A single, expandable disposal facility (similar to the Environmental Restoration Disposal Facility) would be used for each waste type. A new LLW facility would be located in the 200 West Area and new MLLW, ILAW, and WTP melter facilities would be located in the 200 East Area. Treatment alternatives would be the same as those described for Alternative Group A.

Alternative Group D – ***Single Combined-use Disposal Facility – Onsite and Offsite Treatment***: LLW, MLLW, ILAW, and WTP melters would be disposed of in a single facility. Disposal would occur either near the PUREX Plant (D_1), in the 200 East Area Low Level Burial Grounds (D_2), or at the Environmental Restoration Disposal Facility (D_3). Treatment alternatives would be the same as those described for Alternative Group A.

Alternative Group E – ***Dual Combined-use Disposal Facilities – Onsite and Offsite Treatment***: LLW and MLLW would be disposed of in one combined-use facility; ILAW and WTP melters would be disposed of in another combined-use facility. Disposal would occur in some combination of locations as shown in Figure 1.7. Treatment alternatives would be the same as those described for Alternative Group A.

1.7.4 Environmental Impact Analyses in the HSW EIS

Analyses of environmental consequences from waste management operations in the HSW EIS include assessment of impacts in the following areas as required by NEPA:

- land use
- air quality
- water quality
- geologic resources
- ecological resources
- socioeconomics
- cultural resources
- transportation
- noise
- health and safety
- aesthetic and scenic resources
- environmental justice
- cumulative impacts
- irreversible and irretrievable commitments of resources
- unavoidable adverse impacts
- potential mitigation measures.

Changes to the environmental consequences analysis in this final HSW EIS as a result of public comments include additional evaluation of the impacts on groundwater quality, ecological impacts, and additional analysis of the offsite transportation consequences. The cumulative impacts analysis is also more comprehensive.

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