DOE/EIS – 0337F

WEST VALLEY DEMONSTRATION PROJECT WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT

FINAL SUMMARY

December 2003

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Abstract:

The purpose of the *Final West Valley Demonstration Project Waste Management Environmental Impact Statement* is to provide information on 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, to offsite disposal locations, and to continue its ongoing onsite waste management activities. Decommissioning or long-term stewardship decisions will be reached based on a separate EIS that is being prepared for that decisionmaking. This EIS evaluates the environmental consequences that may result from actions to implement the proposed action, including the impacts to the onsite workers and the offsite public from waste transportation and onsite waste management. The EIS analyzes a no action alternative, under which most wastes would continue to be stored onsite over the next 10 years. It also analyzes an alternative under which certain wastes would be shipped to interim offsite storage locations prior to disposal. The Department's preferred alternative is to ship wastes to offsite disposal locations.

Public Comments:

The WVDP Waste Management EIS was issued in draft on May 16, 2003, for public review and comment. A public hearing on the Draft EIS was held on June 11, 2003, at the Ashford Office Complex near the WVDP site. DOE received comments from 21 individuals, organizations, and agencies.

A complete copy of the WVDP Waste Management Final EIS can be viewed at:
http://www.wv.doe.gov/LinkingPages/RevisedEnvironmental%20Impact%20Statement.htm.

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SUMMARY

1.0 INTRODUCTION

Background

As part of its ongoing West Valley Demonstration Project (WVDP), and in accordance with the West Valley Demonstration Project Act and previous U.S. Department of Energy (DOE or the Department) decisions, DOE proposes to:

- Continue onsite management of high-level radioactive waste (HLW) until it can be shipped for disposal to a geologic repository (assumed for the purposes of analysis to be the proposed Yucca Mountain Repository in Nye County, Nevada),
- Ship low-level radioactive waste (LLW) and mixed (radioactive and hazardous) LLW offsite for disposal at DOE or other disposal sites, and
- Ship transuranic (TRU) radioactive waste to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico.

The waste volumes that are the subject of evaluation in this EIS include only those wastes that are either currently in storage or that would be generated over the next 10 years from ongoing operations and decontamination activities. This EIS analyzes activities that would occur during a 10-year period.

The proposed actions and alternatives assessed in this environmental impact statement (EIS) are intended to address DOE's responsibilities under the West Valley Demonstration Project Act and are consistent with the terms of the Stipulation of Compromise reached with the Coalition on West Valley Nuclear Wastes and Radioactive Waste Campaign. Implementation of theses actions would allow DOE to make progress in meeting its obligations under the Act that pertain to waste management, and they are consistent with programmatic decisions DOE has made regarding the waste types addressed in this EIS. Those decisions and their respective EISs, as they apply to the WVDP, provide for shipping wastes from the West Valley site to other regional or centralized DOE sites for treatment, storage, and disposal, as appropriate. The Department has analyzed the potential environmental impacts associated with this proposal and reasonable alternatives in accordance with the National Environmental Policy Act (NEPA) and applicable NEPA regulations issued by the Council on Environmental Quality (Title 40 of the Code of Federal Regulations [CFR] Parts 1500-1508) and DOE (10 CFR Part 1021).

The scope of this EIS departs from that which was announced in a March 2001 Notice of Intent (NOI) (66 Fed. Reg. 16447 (2001)). The scope is now limited to onsite waste management and offsite waste transportation activities, and no longer includes decontamination activities as proposed in the NOI. DOE modified the scope of this EIS as a result of public comments received during scoping and the Department's further evaluation of activities that might be required, and independently justified, before final decisions are made on decommissioning and/or long-term stewardship.

The continuation of the *Draft Environmental Impact Statement for Completion of the West Valley Demonstration Project and Closure or Long-Term Management of Facilities at the Western New York Nuclear Service Center*, also referred to as the 1996 Completion and Closure Draft EIS, will be accomplished with a revised *Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center EIS*. An Advance NOI was issued on November 6, 2001 (66 Fed. Reg. 56090 (2001)), formalizing DOE's commitment to begin work on the

Decommissioning and/or Long-Term Stewardship EIS. An NOI was published on March 13, 2003 (68 Fed. Reg. 12044 (2003)).

The WVDP is located on the Western New York Nuclear Service Center (also referred to as the Center). The Center comprises 13.5 square kilometers (5 square miles) in West Valley, New York, and is located in the town of Ashford, approximately 50 kilometers (30 miles) southeast of Buffalo, New York. It was a commercial nuclear fuel reprocessing plant and was the only one to have operated in the United States. Figure S-1 shows the locations of the Center and the WVDP site within the State of New York.

The Center operated under a license issued by the Atomic Energy Commission (now the U.S. Nuclear Regulatory Commission [NRC]) in 1966 to Nuclear Fuel Services, Inc., and the New York State Atomic and Space Development Authority, now known as the New York State Energy Research and Development Authority (NYSERDA).

During reprocessing, spent nuclear fuel from commercial nuclear power plants and DOE sites was chopped, dissolved, and processed by a solvent extraction system to recover uranium and plutonium. Fuel reprocessing ended in 1972 when the plant was shut down for modifications to increase its capacity, reduce occupational radiation exposure, and reduce radioactive effluents. In 1976, Nuclear Fuel Services judged that over $600 million would be required to modify the facility to increase its capacity and to comply with changes in regulatory standards. As a result, the company announced its decision to withdraw from the nuclear fuel reprocessing business and exercise its contractual right to yield responsibility for the Center to NYSERDA. Nuclear Fuel Services withdrew from the Center without removing any of the in-process nuclear wastes. NYSERDA now holds title to and manages the Center on behalf of the people of the State of New York.

Types of Radioactive Waste at WVDP

There are four types of radioactive waste at the WVDP site:

- *High-level radioactive waste* is defined in the West Valley Demonstration Project Act as the high-level waste that was produced by the reprocessing of spent nuclear fuel at the Center. The term includes both liquid wastes and such other material as the NRC designates as high-level radioactive waste for purposes of protecting public health and safety.
- *Transuranic waste* is currently defined by NRC and DOE as waste containing more than 100 nanocuries of alpha-emitting isotopes, with half-lives greater than 20 years, per gram of waste. However, the West Valley Demonstration Project Act defined TRU waste as "material contaminated with radioactive elements that have an atomic number greater than 92, including neptunium, plutonium, americium, and curium, and that are in concentrations greater than *10* (emphasis added) nanocuries per gram, or in such other concentrations as the [NRC] may prescribe to protect the public health and safety." [In the event wastes are disposed of offsite, the applicable definitions at the disposal site will be used.]
- *Low-level radioactive waste* is radioactive waste that is not high-level waste, transuranic waste, spent nuclear fuel, or by-product tailings from processing of uranium or thorium ore. Depending on the degree of radioactivity present, low-level waste is defined in Nuclear Regulatory Commission regulations as Class A, B, C, or Greater-Than-Class-C low-level waste.
- *Mixed waste* is waste that contains hazardous waste regulated by the Resource Conservation and Recovery Act and radioactive material subject to the Atomic Energy Act.

In 1978, Congress enacted the Department of Energy Act (Pub. L. No. 95-238), which, among other things, directed DOE to conduct a study to evaluate possible federal operation or permanent federal ownership of the Center and use of the Center for other purposes. DOE issued the *Western New York Nuclear Service Center Study: Companion Report* to provide historical perspective and to identify options for the future of the Center. The Companion Report did not attempt to select an option for the

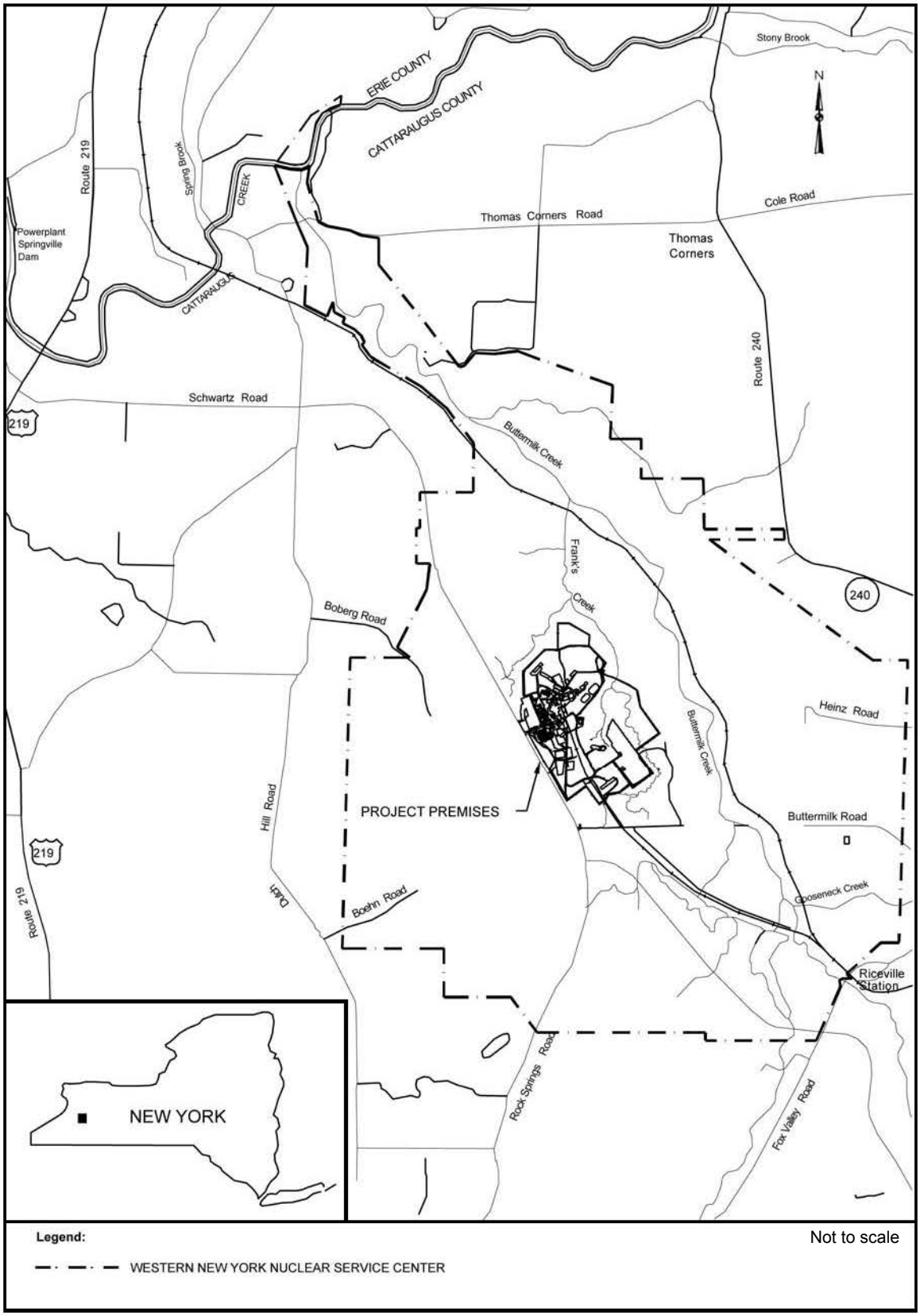

Figure S-1. Location of the West Valley Demonstration Project

future of the Center, although it included recommendations that development of technology to immobilize liquid HLW be started immediately. Congress subsequently passed the West Valley Demonstration Project Act (Pub. L. No. 96-368; 42 U.S.C. 2021a) in 1980.

The West Valley Demonstration Project Act requires DOE to demonstrate that the liquid HLW from reprocessing can be safely managed by solidifying it at the Center and transporting it to a geologic repository for permanent disposal. Specifically, Section 2(a) of the Act requires DOE to:

- Solidify HLW by vitrification or by such other technology that DOE deems effective,
- Develop containers suitable for the permanent disposal of the solidified HLW,
- Transport the solidified HLW to an appropriate federal repository for permanent disposal,
- Dispose of the LLW and TRU waste produced by the HLW solidification program, and
- Decontaminate and decommission the waste storage tanks and facilities used to store HLW, the facilities used for HLW solidification of the waste, and any material and hardware used in connection with the project in accordance with such requirements as the NRC may prescribe.

This EIS evaluates alternatives for meeting DOE's waste management responsibilities under the Act. DOE is preparing the Decommissioning and/or Long-Term Stewardship EIS to address decommissioning and closure alternatives.

Purpose and Need

In accordance with the directives in the West Valley Demonstration Project Act, DOE is responsible for the facilities used in connection with the WVDP HLW vitrification effort and for disposal of the LLW, mixed LLW, HLW, and TRU waste produced by the WVDP HLW solidification program. To fulfill its responsibilities under the West Valley Demonstration Project Act, DOE needs to identify a disposal path for the wastes that are currently stored onsite and that will be generated from ongoing operations and decontamination activities that will occur over the next 10 years. Decommissioning and/or long-term stewardship decisions will be made under the Decommissioning and/or Long-Term Stewardship EIS.

NEPA Compliance Strategy

In the early 1980s, DOE prepared an environmental assessment (EA) on the proposed disposal of certain radioactive wastes in two engineered disposal areas that would have been developed near and within an NRC-licensed disposal area. In 1986, the Coalition on West Valley Nuclear Wastes and Radioactive Waste Campaign filed a lawsuit challenging the EA and subsequent finding of no significant impact (FONSI) prepared by DOE. Under a Stipulation of Compromise that settled the litigation, DOE agreed that it would evaluate the disposal of Class A, B, and C LLW generated as a result of activities in a Completion and Closure EIS.

DOE began preparation of the *Draft Environmental Impact Statement for Completion of the West Valley Demonstration Project and Closure or Long-Term Management of Facilities at the Western New York Nuclear Service Center*, also referred to as the 1996 Completion and Closure Draft EIS, in 1988 with the issuance of a NOI to Prepare an EIS. DOE and NYSERDA were joint lead agencies for the preparation of the EIS. The scope of that EIS includes, among other things, the management of Class A, B, and C LLW and TRU waste that is either stored onsite or that would be generated as a result of site closure

activities. The Completion and Closure Draft EIS was issued in January 1996 for a 6-month comment period in accordance with the Stipulation of Compromise.

The 1996 Draft EIS evaluated the environmental impacts of alternatives considered for completing the WVDP and closure or long-term management of facilities at the Center, but it did not specify a preferred alternative. Many of the public comments submitted on the 1996 Draft EIS stated that DOE and NYSERDA should have indicated the preferred alternative in the Draft EIS. Despite long negotiations, DOE and NYSERDA have been unable to reach an agreement on a preferred future course of action for the closure of the Center. This has delayed the development and issuance of the Completion and Closure Final EIS.

To allow the Department to continue to meet its obligations under the West Valley Demonstration Project Act, DOE is preparing two EISs: this *West Valley Demonstration Project Waste Management EIS* and the *Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center EIS*. In March 2001, DOE published its strategy for completing the 1996 Completion and Closure Draft EIS and an NOI to prepare a Decontamination and Waste Management EIS (66 Fed. Reg. 16447 (2001)). This EIS was originally scoped as a revision of the 1996 Completion and Closure Draft EIS. In the NOI, DOE published for comment its position that its decisionmaking process would be facilitated by preparing and issuing for public comment a Revised Draft EIS that focused on DOE's actions to decontaminate the Project Facilities and manage WVDP wastes controlled by DOE under the West Valley Demonstration Project Act. As part of its strategy to address the full scope of the 1996 Completion and Closure Draft EIS, DOE also stated in the NOI its intention to prepare an EIS with NYSERDA subsequent to this one in order to address the decommissioning and/or long-term stewardship of the WVDP and the Western New York Nuclear Service Center.

Ongoing Operations

Under all alternatives, it is assumed that current levels of maintenance, surveillance, heating, ventilation, and other routine operations would continue to be required while the actions proposed under each alternative were performed. For this EIS, these actions are called *ongoing operations*. Although the impacts of these ongoing actions have been assessed in several previous NEPA documents and are characterized in the Annual Site Environmental Reports, the impacts on worker and public health of these ongoing operations have been included in this EIS using actual operational data from 1995 through 1999. Because ongoing operations would not vary among the proposed alternatives, the impacts from these actions would be the same across all alternatives.

During scoping for the Decontamination and Waste Management EIS, commentors noted that applicable NEPA regulations require an agency to consider connected actions together in the same EIS (40 CFR 1508.25(a)), and they argued that the decontamination and waste management actions proposed in the NOI were "connected" to the decommissioning and/or long-term stewardship actions that would be addressed in the second EIS. After further evaluation and as a result of the public comments, DOE has limited the scope of this EIS to onsite and offsite waste management actions, and only those decontamination actions previously addressed under NEPA (DOE/EIS-0081). The *Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center EIS* will be the continuation of the Completion and Closure Draft EIS begun in 1988 and issued in draft form in 1996.

Public Involvement

The WVDP Waste Management EIS was issued in draft on May 16, 2003, for public comment (68 Fed. Reg. 26587). The 45-day comment period ended on June 30, 2003, although DOE also considered comments received after that date. A public hearing on the Draft EIS was held on June 11, 2003, at the

Ashford Office Complex near the WVDP site. DOE received comments from 21 individuals, organizations, and agencies.

Major issues raised in the public comments involve management of the HLW tanks and compliance with the Stipulation, WVDP Act and NEPA. Commenters stated that an action to place low-strength grout in the tanks for interim stabilization that was analyzed under Alternative B should more appropriately be analyzed under the Decommissioning and/or Long-Term Stewardship EIS. DOE agrees and has removed all reference to that activity in this Final EIS.

Commenters concerned about DOE's compliance with the Stipulation, WVDP Act and NEPA stated that the Stipulation and Act allow the preparation of only one EIS, that the Stipulation requires a 6-month public comment period, and that DOE's NEPA strategy of preparing two EISs to meet its responsibility under the Act and Stipulation is akin to segmentation not allowed under NEPA. In DOE's view, neither the Stipulation nor the Act requires the preparation of only one EIS. DOE will meet all of the commitments of the Stipulation by completing this Final Waste Management EIS and the Decommissioning and/or Long-Term Stewardship EIS now in progress. DOE will hold a 6-month public comment period on the Decommissioning and/or Long-Term Stewardship EIS, which is the continuation of the 1996 Cleanup and Closure EIS as described in Section 1.2.3. Regarding DOE's NEPA strategy, none of the alternatives or actions analyzed in this EIS will affect the reasonable range of alternatives available for the Decommissioning and/or Long-Term Stewardship EIS or preclude any decisions to be made under that EIS. DOE therefore does not believe that its NEPA strategy involves impermissible segmentation of the actions.

Other comments from stakeholders in states hosting DOE sites that could receive West Valley wastes expressed concern about receiving those wastes, particularly for interim storage of TRU waste and HLW. DOE's preferred alternative, Alternative A, is to ship LLW and mixed LLW to DOE sites for disposal, consistent with decisions made under the WM PEIS, and to ship TRU waste and HLW directly to WIPP and Yucca Mountain respectively for disposal, consistent with decisions under the EISs for those facilities. While not DOE's preferred alternative, Alternative B, which includes interim storage of West Valley's TRU waste and HLW, is a reasonable alternative and is therefore included in this Final EIS as required under NEPA.

DOE has made several changes to this Final EIS in response to individual public comments. Sidebars beside the text identify where all changes from the Draft to the Final EIS have been made, although sidebars are not used to indicate changes in figures. Appendix E contains DOE's response to all public comments received on the Draft EIS.

Project Facilities

The Project Facilities and areas storing the wastes evaluated in this EIS are shown in Figure S-2. These facilities and areas are:

- ***Process Building***, which includes approximately 70 rooms and cells that comprised the original NRC-licensed spent nuclear fuel reprocessing operations (one of the cells—the Chemical Process Cell—now serves as the storage facility for the vitrified HLW canisters);

- ***Tank Farm***, which includes the underground waste storage tanks, 8D-1 and 8D-2, and supporting systems for maintenance, surveillance, and waste transfer of the tank waste to the Vitrification Facility;

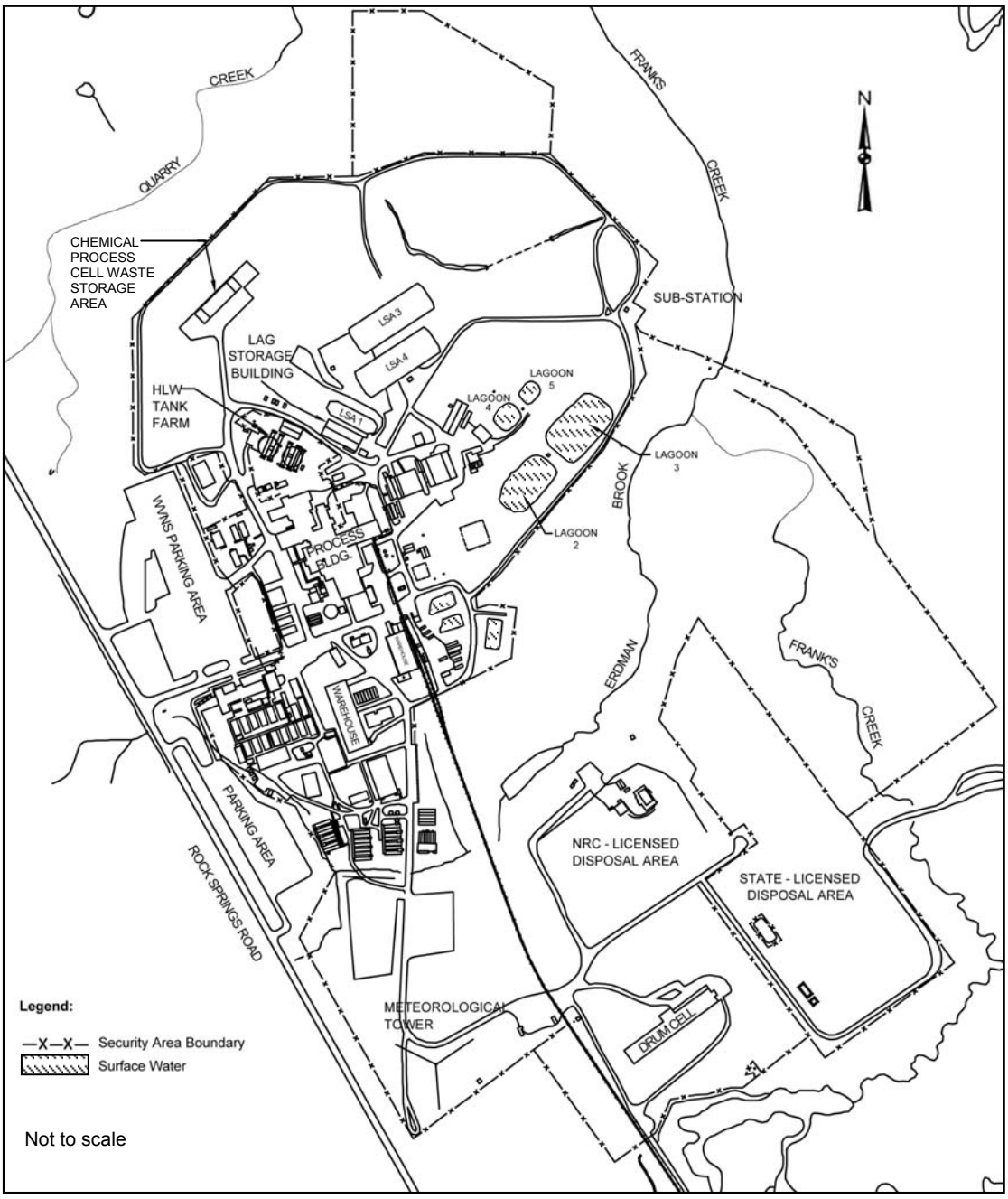

Figure S-2. West Valley Demonstration Project Facility Layout

- ***Waste Storage Areas***, which include several facilities such as the Lag Storage Building (LSB), Lag Storage Areas (LSA) 1, 3, and 4, and the Chemical Process Cell Waste Storage Area, are used to store and manage the radioactive wastes generated from WVDP activities; and

- ***Radwaste Treatment System Drum Cell*** (Drum Cell), which stores cement-filled drums of stabilized LLW produced by the Cement Solidification System.

2.0 DESCRIPTION OF ALTERNATIVES

The EIS analyzes three alternatives for the continued onsite waste management and shipment of wastes to offsite disposal, as described below. Based on the assumption that WVDP budgets remain comparable to current funding levels, it is anticipated that the actions proposed in this EIS would take approximately 10 years to complete; hence, the analyses in this EIS assume a 10-year operational period. Figure S-3 shows the locations of the waste disposal and/or interim storage sites under consideration in this EIS.

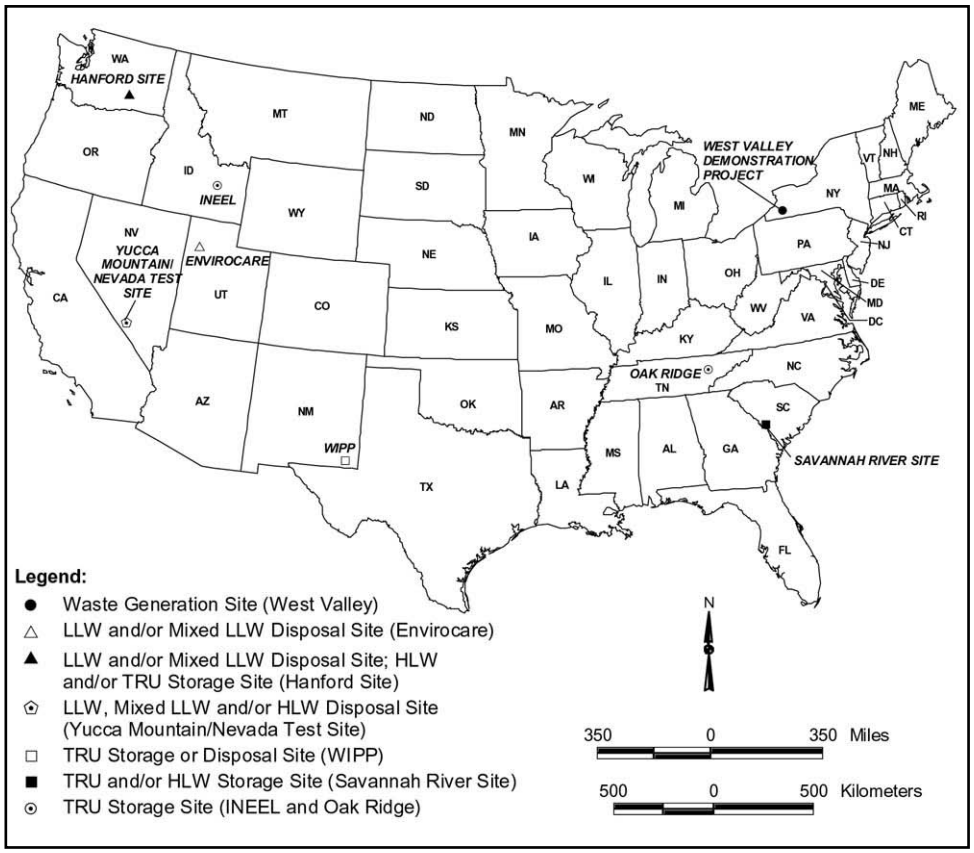

Figure S-3. WVDP Waste Disposal and/or Interim Storage Sites

Under the **No Action Alternative**, **Continuation of Ongoing Waste Management Activities,** waste management would include continued storage of existing Class B and Class C LLW, TRU waste, and HLW. Limited amounts of Class A LLW (4,060 cubic meters [145,000 cubic feet]) would be shipped to offsite disposal and the remainder would be stored onsite. Upon completion of ongoing efforts to remove wastes to the extent that is technically and economically practical, the waste storage tanks and their surrounding vaults would continue to be ventilated to manage moisture levels as a corrosion prevention measure. Waste transportation destinations proposed under the No Action Alternative are shown in Figure S-4.

Under **Alternative A, Offsite Shipment of HLW, LLW, Mixed LLW, and TRU Wastes to Disposal (Preferred Alternative)**, DOE would ship Class A, B, and C LLW (19,200 cubic meters [685,515 cubic feet]) and mixed LLW (221 cubic meters [7,889 cubic feet]) to one of two DOE potential disposal sites (in Washington or Nevada) or to a commercial disposal site (such as the Envirocare facility in Utah); ship TRU waste (1,372 cubic meters [49,000 cubic feet]) to WIPP in New Mexico; and ship HLW (300

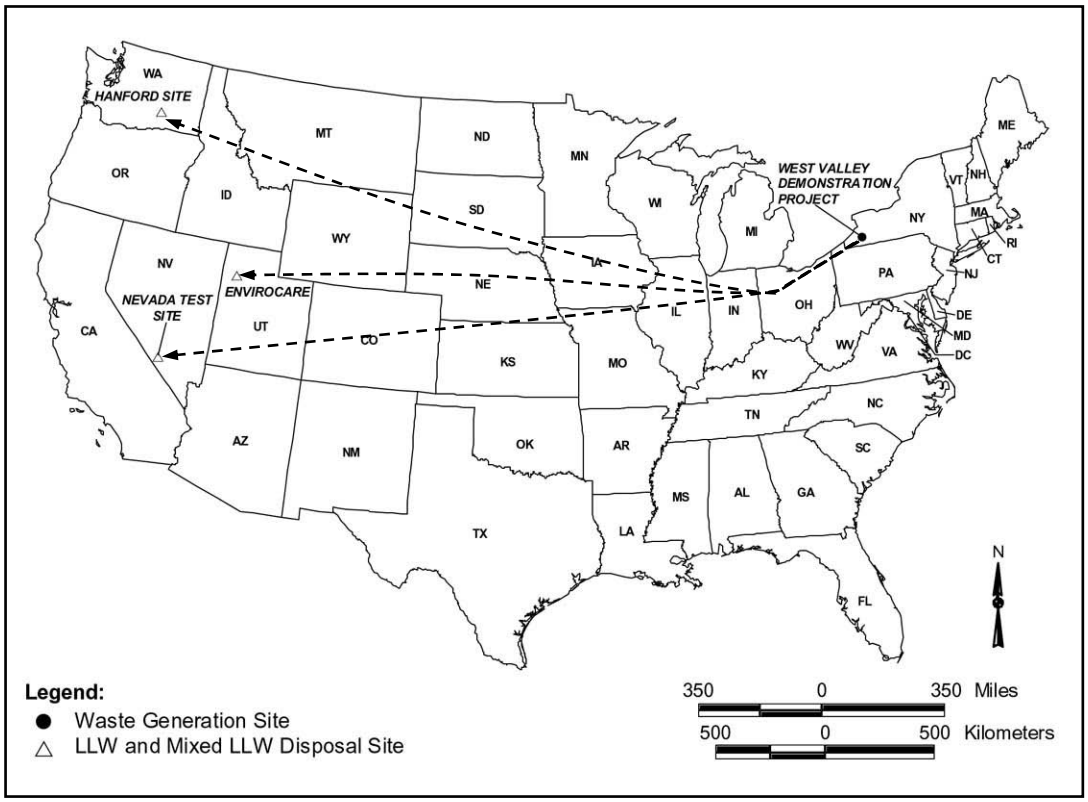

Figure S-4. Waste Destinations Under the No Action Alternative

canisters) to the proposed Yucca Mountain HLW Repository. LLW and mixed LLW would be shipped over the next 10 years. TRU waste shipments to WIPP could occur within the next 10 years if the TRU waste were determined to meet all the requirements for disposal in this repository. If some or all of WVDP's TRU waste did not meet these requirements, the Department would need to explore other alternatives for disposal of this waste.

Under DOE's current programmatic decisionmaking, offsite disposal of HLW would occur at the proposed Yucca Mountain HLW Repository sometime after 2025 assuming a license to operate is granted by NRC and NYSERDA signs a standard contract for the disposal of HLW in accordance with the Nuclear Waste Policy Act. Although this period would extend well beyond the 10 years required for all other proposed actions under this alternative, the impacts of transporting the HLW have been included in this EIS to fully inform the decisionmakers should an earlier opportunity to ship HLW present itself. The waste storage tanks would continue to be managed as described under the No Action Alternative. Waste transportation destinations proposed under Alternative A are shown in Figure S-5.

Under **Alternative B, Offsite Shipment of LLW and Mixed LLW to Disposal, and Shipment of HLW and TRU Waste to Interim Storage**, LLW and mixed LLW would be shipped offsite for disposal at the same locations as Alternative A. TRU wastes (1,372 cubic meters [49,000 cubic feet]) would be shipped for interim storage at one of five DOE sites: Hanford Site in Washington; Idaho National Engineering and Environmental Laboratory (INEEL); Oak Ridge National Laboratory (ORNL) in Tennessee; Savannah River Site (SRS) in South Carolina; or WIPP. TRU wastes would subsequently be shipped to WIPP (or would remain at WIPP) for disposal. HLW (300 canisters) would be shipped to SRS or Hanford for interim storage, with subsequent shipment to Yucca Mountain for disposal.

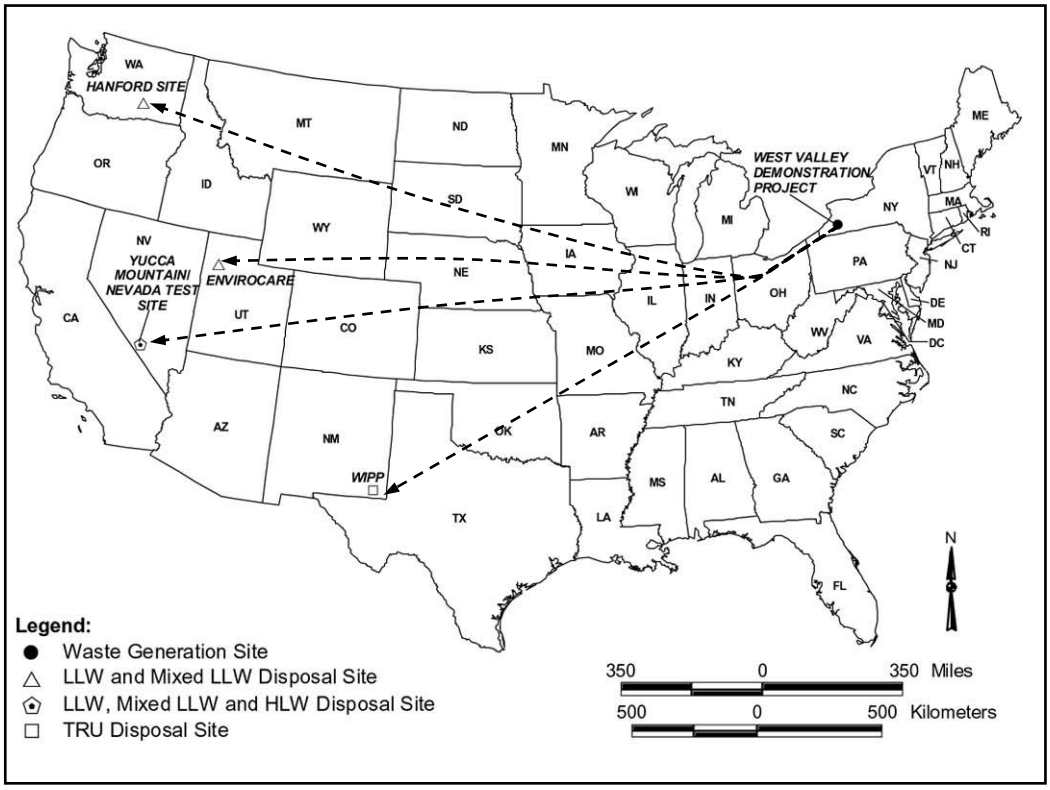

Figure S-5. Waste Destinations Under Alternative A

It is assumed that the shipment of LLW and mixed LLW to disposal would occur within the next 10 years, and that TRU waste and HLW would be shipped to interim storage during that same 10 years. Ultimate disposal of TRU wastes and HLW wastes would be subject to the same constraints described under Alternative A; however, the impacts of transporting these wastes to their ultimate disposal sites have been included in the impact analyses for this alternative. The waste storage tanks would continue to be managed as described under the No Action Alternative. Waste transportation destinations proposed under Alternative B are shown in Figure S-6.

Offsite Activities

In addition to activities that would occur at WVDP, DOE's proposed action and alternatives would involve activities at offsite locations as a result of the need for interim storage or disposal (see Figures S-4 through S-6). At interim storage sites, activities would include unloading and inspecting the WVDP waste containers and moving the containers to the storage area. Interim storage could require the siting, construction, and operation of additional storage capacity for the volume of WVDP wastes to be stored, depending on site storage capacity at the time. Activities at disposal sites would include unloading trucks or railcars, inspecting the waste containers, and moving the waste to the disposal areas for shallow land burial or deep geologic disposal, depending on the waste type. Offsite activities involving interim storage or disposal were addressed in previous NEPA documents or would be the subject of subsequent NEPA review, as needed.

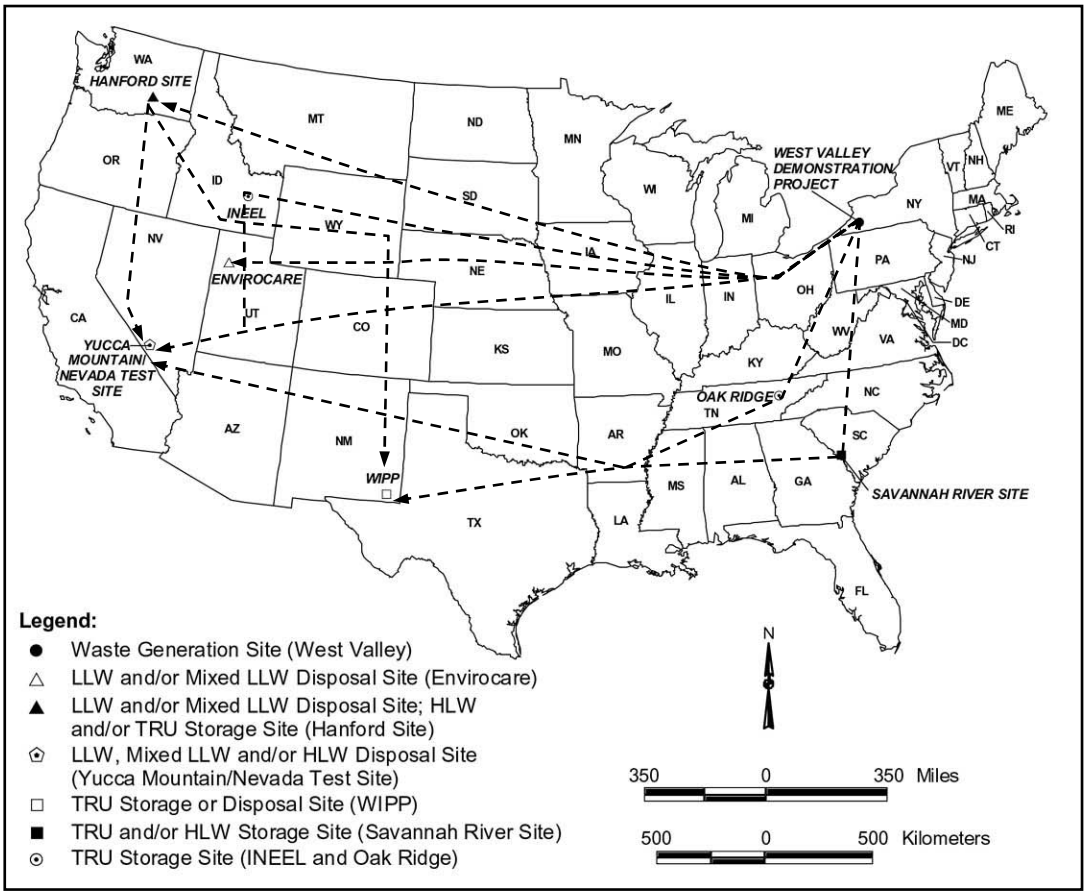

Figure S-6. Waste Destinations Under Alternative B

Alternatives Considered But Not Analyzed

In contrast with alternatives assessed in the *Draft Environmental Impact Statement for Completion of the West Valley Demonstration Project and Closure or Long-Term Management of Facilities at the Western New York Nuclear Service Center* (DOE/EIS-0226-D), this EIS does not analyze any new onsite disposal of wastes or indefinite storage of currently stored wastes or wastes to be generated as a result of ongoing operations over the next 10 years. DOE has issued EISs and decisions that identify disposal sites other than the WVDP for each waste type considered in this EIS (see Section 1.7). These sites, identified in Alternatives A and B, already have existing or planned disposal capacity; they are safe, secure, and suitable from an environmental standpoint. In light of the current and anticipated availability of disposal facilities at these other sites, DOE presently does not consider an alternative to construct and maintain waste storage facilities at the WVDP to be practical or reasonable over time, because of continuing costs of construction of new facilities and maintenance of existing facilities.

3.0 AFFECTED ENVIRONMENT

This section characterizes the receptors and environmental media that may be affected by the proposed waste management activities.

Geology and Soils

The Western New York Nuclear Service Center is located on the Glaciated Allegheny Plateau section of the Appalachian Plateau Physiographic Province. This plateau has been subjected to the erosional and depositional actions of repeated glaciations, resulting in the accumulation of various glacial deposits over the area. Erosion resulting from streams and rivers and landslides currently are altering the glacial landscape. No geologic fold or fault of any consequence is recognized within the site area. From 1737 to 1999, there have been 119 recorded earthquakes within 480 kilometers (300 miles) of the WVDP site with epicentral intensities of Modified Mercalli Intensities V to VII; of these, 25 occurred within 320 kilometers (200 miles) of the WVDP site. The highest Modified Mercalli Intensity estimated to have occurred at the Center within the last 100 years was an Intensity of IV, which is similar to vibrations from a heavy truck that might be felt by people indoors, but do not cause damage.

Hydrology

Surface Water. The WVDP Facilities and its two water supply reservoirs (formed by blocking off two streams with earthen dams and located south of the main Project Facilities) lie in separate watersheds, both of which are drained by Buttermilk Creek. Buttermilk Creek, which roughly bisects the Western New York Nuclear Service Center, flows in a northwestward direction to its confluence with Cattaraugus Creek, at the northwest end of the Center. Several tributary streams flow into Buttermilk Creek at the Center. Buttermilk Creek flows into Cattaraugus Creek, which flows westward from the Buttermilk Creek confluence to Lake Erie, 63 kilometers (39 miles) downstream. Figure S-2 shows the surface water bodies on the Western New York Nuclear Services Center.

Neither Buttermilk Creek nor Cattaraugus Creek downstream of the WVDP site are used as a regular source of potable water. The steep-walled nature of the downstream valley and the region's annual precipitation combine to make irrigation from the creeks impracticable and unnecessary. Cattle from a neighboring dairy farm have access to Buttermilk Creek near the confluence of Cattaraugus Creek. Milk from the cattle is monitored for radioactivity on a routine basis. Cattaraugus Creek downstream of Buttermilk Creek is a popular fishing and canoeing/rafting waterway. As such, Cattaraugus Creek water, fish, and sediments are monitored as part of the WVDP environmental monitoring program.

Groundwater. The WVDP site is underlain by two aquifer zones, neither of which can be considered highly permeable or productive. The upper aquifer consists of surficial, gravelly deposits. The second aquifer zone consists of weathered, fractured, and decomposed shale and rubble at the contact between the overlying till and shale bedrock. Groundwater in the surficial unit tends to move in an easterly or northeasterly direction from the western boundary of the site, close to Rock Springs Road. Groundwater recharging the weathered shale and rubble zone tends to move eastward.

The Center is located within the Cattaraugus Creek Basin Aquifer System, a system that has been designated by the U.S. Environmental Protection Agency (EPA) as a sole or principal source of drinking water for the surrounding towns (52 FR 36102 (1987)). This means that all projects with federal financial assistance constructed in this basin are subject to EPA review to ensure that they are designed and constructed so as not to create a significant hazard to public health. WVDP waste management actions would not require any facility construction at the Center and are not expected to cause construction or any other impacts requiring EPA review on the surface water or groundwater resources described in this section.

Wells identified near the Western New York Nuclear Service Center serve residences and farms, and the maximum number of persons served per well was 10. Most of the wells are located on the higher elevations east and west of the Center, along the principal north-south county roads. A second

concentration of wells is located on the lowlands north of the Center in the vicinity of Bond Road and Thomas Corners Road. The wells are upgradient of or are otherwise hydraulically isolated from groundwater at the site.

Water supplies north of the Western New York Nuclear Service Center and south of Cattaraugus Creek derive mainly from springs and shallow dug wells. The distribution of springs and the general geologic relationships indicate that the groundwater system here is disconnected from the WVDP site both hydraulically and topographically. Nonetheless, water supplies developed from bedrock wells in this same area downstream and downgradient of the WVDP site might be hydraulically connected to water originating on the site through the surface water system and shale exposures in the lower reaches of Buttermilk Creek.

Supply wells on the uplands bordering the Western New York Nuclear Service Center, such as along Route 240 and Dutch Hill Road, are completed in bedrock. A similar situation exists on the uplands east of the Center. Groundwater supplies in both of these areas can be assumed to be isolated hydraulically from groundwater in bedrock at lower elevations beneath the Center and the WVDP site.

Meteorology and Air Quality

The WVDP site is situated approximately 50 kilometers (30 miles) inland from the eastern end of Lake Erie in western New York State. The climate of western New York State is of the moist continental type prevalent in the northeastern United States. The climate is diverse due to the influence of several atmospheric and geographic factors or controls.

Western New York is bordered by two of the Great Lakes: Lake Erie on the west and Lake Ontario on the north. These exert a major controlling influence on the climate of the region. Topography also affects the climate. Elevations in western New York range from about 110 meters (350 feet) along the Lake Ontario shore in Oswego County to more than 610 meters (2,000 feet) in the southwestern highlands of Cattaraugus and Allegheny counties. The southern two-thirds of the region is composed of hilly, occasionally rugged terrain with elevations generally above 300 meters (1,000 feet). This area is interspersed with numerous river valleys and gently sloping plateau areas. Such topographic features may produce locally significant variation of climatic elements within relatively short distances.

Locally, severe thunderstorms would be the most likely event to cause wind damage at the site, particularly in late spring and summer. Thunderstorms occur about 30 days per year, with the most thunderstorms occurring in June, July, and August. Severe thunderstorms, with winds in excess of 22 meters per second (50 miles per hour), do occur in western New York every year. On the average, about one tornado can be expected to strike in western New York State annually. From 1950 to 1990, 17 tornadoes were reported within 80 kilometers (50 miles) of the WVDP site.

New York is divided into nine regions for assessing state ambient air quality. The WVDP site is located in Region 9, which is comprised of Niagara, Erie, Wyoming, Chautauqua, Cattaraugus, and Allegany counties. The WVDP site and the surrounding area in Cattaraugus County are in attainment with the National Primary and Secondary Ambient Air Quality Standards contained in 40 CFR 50 and New York State air quality standards contained in 6 NYCRR 257. The city of Buffalo, located about 48 kilometers (30 miles) from the WVDP site, is a marginal nonattainment area for ozone.

Ecological Resources

The Western New York Nuclear Service Center lies within the northern hardwood forest region. Its climax community forests are characterized by the dominance of sugar maple, beech, and Eastern hemlock. At present, the site is about equally divided between forestland and abandoned farm fields.

The U.S. Department of the Interior and the New York State Department of Environmental Conservation maintain lists of threatened and endangered species of wildlife that are protected under the Endangered Species Act of 1973 and the Fish and Wildlife Coordination Act of 1958. Except for occasional transient individuals, there are no federally listed or proposed endangered or threatened species in the vicinity of the WVDP. Based on population range maps, there are 12 federally threatened or endangered species with potential for occurring at the Western New York Nuclear Service Center, although they have not been observed on the site (Table S-1).

Table S-1. State and Federally Threatened or Endangered Animal Species Potentially Occurring at the Center

Species	Status
Birds	
Common tern	State threatened
Bald eagle	Federal threatened and state endangered; proposed for removal from the Federal Endangered Species list
Loggerhead shrike	State endangered
Northern harrier	State threatened
Osprey	State threatened; recommended for state special concern status
Peregrine falcon	State endangered
Piping plover	Federal and state endangered
Red-shouldered hawk	State threatened; recommended for state special concern status
Spruce grouse	State threatened recently; recommended for state endangered status
Mammals	
Indiana bat	Federal and state endangered
Herptiles	
Eastern massasauga	State endangered
Timber rattlesnake	State threatened

Field investigations in 1990 and 1991 recorded one species (Northern harrier) on the state list of threatened species and six state species of special concern (Cooper's Hawk, upland sandpiper, common raven, Eastern bluebird [recommended for unlisted status], Henslow's sparrow [recommended for threatened status], and vesper sparrow). State of New York "special concern species" are species of fish and wildlife found to be at risk of becoming endangered or threatened in New York. All of the noted species were observed in areas of the Western New York Nuclear Service Center outside the WVDP site. Moreover, none of these threatened species or species of special concern depend on areas within the WVDP boundaries for any aspect of their life cycle.

Field studies were conducted in the spring of 1992 to examine the Western New York Nuclear Service Center with respect to the current state and federal protected plant lists. No federally threatened or endangered species were identified. One each of New York State endangered and threatened plant species were reported in 1992 within the Western New York Nuclear Service Center. However, investigation at the location of the 1992 surveys in June and August 2000 could not confirm evidence of these species.

The U.S. Department of the Interior, Fish and Wildlife Service, maintains a file of habitat locations designated as critical to the survival of federally listed endangered or threatened species. Based on a review of the most recent listings, no such habitats occur in or around the site. Critical habitats are also designated by the New York State Department of Environmental Conservation, Bureau of Wildlife for areas found to be of significance to game and other important wildlife species. Such areas could include seasonally important wintering areas and breeding grounds. A 16-square-kilometer (6-square-mile) area encompassing the entire Western New York Nuclear Service Center site has been classified as critical habitat due to its extensive use as a whitetail deer (a game species) wintering area. The area has been designated because softwood shelter availability is rated intermediate, and food availability is rated good. Five other areas within a 16-kilometer (10-mile) radius of the site are similarly designated.

Examination of state and federal lists of threatened and endangered species and range maps, performance of field sampling and a literature survey, and interviews with local experts provided no indication that any threatened or endangered aquatic flora or fauna exist in the reservoirs, ponds, or streams on the Western New York Nuclear Service Center or in its vicinity.

The Western New York Nuclear Service Center has meadows, marshes, lakes, ponds, bogs, and other areas that are considered functional wetlands. Fifty-one such areas have been identified as wetlands under the jurisdiction of the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act. The site's topographic setting renders the likelihood of major flooding unlikely, and local run-off and flooding is adequately accommodated by natural and man-made drainage systems in and around the WVDP site.

Land Use and Visual Setting

Prior to 1961, much of the Center was cleared for agriculture. As a result, the Center now consists of a mixture of abandoned agricultural areas in various stages of ecological succession, forested tracts, and wetlands and transitional ecotones between these areas. The WVDP is an industrial facility that is visible from several miles away, depending on location. It is well lit at night.

Land use within 8 kilometers (5 miles) of the site is predominantly agricultural (active and inactive) and forestry uses. The major exception is the Village of Springville, which comprises residential/commercial, and industrial land uses. The industries within 8 kilometers (5 miles) of the site are light-industrial and commercial (either retail or service oriented).

Socioeconomics

Population. Data collected during the 2000 Census continue to indicate relatively stable overall population levels in the 12 counties surrounding the Western New York Nuclear Service Center. The total population in these counties has decreased by 3.3 percent since the 1990 census, with a loss of 1.9 percent in Erie County and 0.3 percent in Cattaraugus County. The total calendar year 2000 population within 80 kilometers (50 miles) was 1,535,963 (the population in Canada in 2001 within 80 kilometers of the WVDP site was 148,304).

Employment. DOE estimates that the waste management activities evaluated in this EIS would be accomplished by the existing work force with the technical capabilities now in use at the Western New York Nuclear Service Center. Based on the current employment of 500 persons at the Center, no increases in employment would be anticipated to implement any of the alternatives proposed for this project based on the assumed funding profile used as the basis for this analysis. Funding for the WVDP and the Center is subject to change on an annual basis, and decreases or increases in the levels of program funding and related increases or decreases in employment levels are always possible.

Public Services. The Cattaraugus County Health Department provides health and emergency services for the entire county, with the closest locations to the Western New York Nuclear Service Center being in the towns of Machias and Little Valley. A written protocol for WVDP-related emergency medical needs provides the basis for support in the event of emergency from Bertrand Chaffee Hospital and the Erie County Medical Center.

The Western New York Nuclear Service Center has its own reservoir and water treatment system to service the facility. The system provides potable and facility service water for operating systems and fire protection. The West Valley Volunteer Hose Company provides fire protection services to the Western New York Nuclear Service Center and the Township of Ashford. Responders are trained and briefed on a yearly basis by the Radiation and Safety Department at the Center, and they have some limited training and capability to assist in chemical or radioactive occurrences. The New York State Police and the Cattaraugus County Sheriff Department have overlapping jurisdictions for the West Valley area.

Transportation facilities near the WVDP site include highways, rural roads, a rail line, and aviation facilities. The primary method of transportation in the site vicinity is motor vehicle traffic on the highway system. All roads in Cattaraugus County, with the exception of those within the cities of Olean and Salamanca, are considered rural roads.

Rock Springs Road, adjacent to the site on the west, serves as the principal site access road. The portion of this road between Edies Road and U.S. 219 is known as Schwartz Road. Along this road, between the site and the intersection of U.S. 219, are fewer than 24 residences. State Route 240, also identified as County Route 32, is 2 kilometers (1.2 miles) northeast of the site. Average annual daily traffic on the portion of NY Route 240 that is proximate to the site (between County Route 16 - Rosick Hill Road and NY Route 39) ranges from a low of 440 to a high of 2,250.

Cultural Resources

The Project Premises, in which the proposed waste management actions would take place, contain 114 buildings and structures. The New York State Office of Parks, Recreation, and Historic Preservation has determined that facilities on the Premises are not eligible for inclusion in the *National Register of Historic Places*.

Offsite Activities

In addition to activities at WVDP, implementation of the proposed action or alternatives would involve activities at one or more offsite locations. The following briefly describes the affected environment at each of these sites.

Envirocare is a private facility licensed by the State of Utah (an NRC Agreement State) to accept Class A LLW. Envirocare is also a Resource Conservation and Recovery Act (RCRA) facility that is licensed by the State of Utah and the EPA to receive, possess, use, treat, and dispose of mixed waste. Waste material is disposed of in aboveground, engineered disposal cells that meet regulatory disposal requirements. The facility is located in Clive, Utah, approximately 80 kilometers (50 miles) west of Salt Lake City. Located in a remote area with an arid climate (annual precipitation is approximately 170 millimeters [7 inches] per year), Envirocare received its first DOE waste shipments in 1992 and has received waste shipments from 25 DOE sites. Envirocare is located adjacent to a major rail line and U.S. Interstate Highway 80.

The **Hanford Site** has a number of facilities, including retired plutonium production reactors, waste management and spent nuclear fuel processing facilities, and nuclear research and development laboratories. The site occupies approximately 1,450 square kilometers (560 square miles) of semi-arid desert land in southeastern Washington State, approximately 192 kilometers (119 miles) southwest of Spokane and 240 kilometers (150 miles) southeast of Seattle. The nearest city, Richland, borders the site on its southeast corner. The site is bounded on the east by the Columbia River, on the west by the Rattlesnake Hill, and on the north by Saddle Mountain. U.S. Highways 12 and 395, Interstate-82, and State Route 240 run near the Hanford Site. Two railroads also connect the area with much of the rest of the nation.

Currently, the focus of **INEEL** is environmental restoration, waste management, research, and technology development. Included within the boundaries of the site are the Naval Reactors Facility and Argonne National Laboratory-West. INEEL occupies 2,300 square kilometers (890 square miles) of desert in the southeastern portion of Idaho, approximately 44 kilometers (27 miles) west of Idaho Falls on the Eastern Snake River Plain. The site is bordered by mountain ranges and volcanic buttes. Land at INEEL is used for DOE operations (about 2 percent of the site), recreation, grazing, and environmental research. About 144 kilometers (90 miles) of paved public highway run through INEEL; railroads also serve the area.

The **Nevada Test Site (NTS)** has been the primary location for testing the nation's nuclear explosive devices since 1951. The site occupies 3,500 square kilometers (1,350 square miles) of desert valley and Great Basin mountain terrain in southern Nevada, 105 kilometers (65 miles) northwest of Las Vegas, Nevada. The only permanent onsite water bodies are ponds associated with wastewater disposal and springs. No continuously flowing streams occur on the site. Vehicular access to NTS is provided by U.S. Route 95 from the south. Interstate-15 is the major transportation route in the region. The major railroad in the area is the Union Pacific, which runs through Las Vegas and is located approximately 80 kilometers (50 miles) east of the site.

ORNL is part of the Oak Ridge Reservation (ORR), which also contains the Y-12 Plant, the East Tennessee Technology Park (formerly known as K-25), and the Oak Ridge Institute of Science and Education. ORNL's mission is to conduct applied research and development in support of DOE programs in fusion, fission, conservation, and other energy technologies. The ORR occupies 140 square kilometers (34,545 acres) and is located in the City of Oak Ridge, Tennessee, and 32 kilometers (20 miles) west of Knoxville, Tennessee, in the rolling terrain between the Cumberland Mountains and Great Smoky Mountains. The Clinch River and its tributaries are the major surface water features of the area. Interstate-40, located 2.4 kilometers (1.5 miles) south of the ORR boundary, provides the main access to the cities of Nashville and Knoxville. Interstate-75, located 24 kilometers (15 miles) south of the site, serves as a major route to the north and south. Several state routes provide local access and form interchanges with Interstate-40. Railroad service is also available in the area.

DOE activities conducted at **SRS** have involved tritium recycling, support for the nation's space program missions, storage of plutonium on an interim basis, processing of backlog targets and spent nuclear fuel, waste management, and research and development. SRS is approximately 20 kilometers (12 miles) south of Aiken, South Carolina in southwest-central South Carolina. It is on approximately 800 square kilometers (198,000 acres) of land in a principally rural area, with most of the land serving as a forestry research center. The primary surface water feature is the Savannah River, which borders the site for approximately 32 kilometers (20 miles) to the southwest. Six major streams flow through SRS into the Savannah River, and approximately 190 Carolina bays are scattered throughout the site. Interstate-20 is located approximately 29 kilometers (18 miles) northeast of SRS, providing the nearest interstate access to the site. Railroad service is also available through SRS.

WIPP is located in southeastern New Mexico, about 50 kilometers (30 miles) east of Carlsbad, New Mexico, in a relatively flat, sparsely inhabited plateau with little surface water. The constructed underground facilities include four shafts, an experimental area, an equipment and maintenance area, and connecting tunnels. These underground facilities were excavated 655 meters (2,150 feet) beneath the land surface. The site can be reached by rail or highway. DOE has constructed a rail spur to the site from the Burlington Northern and Santa Fe Railroad 10 kilometers (6 miles) west of the site. The site can also be reached from the north and south access roads constructed for the WIPP project. The south access road intersects New Mexico Highway 128 approximately 7 kilometers (4 miles) to the southwest of WIPP.

The **Yucca Mountain Repository** has been approved by the President and Congress for further development as the nation's first geologic repository for HLW and spent nuclear fuel. The site, located in the southwest corner of NTS, is in a remote area of the Mojave Desert in southern Nevada, about 160 kilometers (100 miles) northwest of Las Vegas, Nevada. The Yucca Mountain region is sparsely populated and receives only about 170 millimeters (7 inches) of precipitation each year. The area is characterized by a very dry climate, limited surface water, and generally deep aquifers. Shipments of HLW and spent nuclear fuel arriving in Nevada would travel to the Yucca Mountain site by truck or rail. At present, there is no rail access to the Yucca Mountain site. If material were shipped by rail, a branch line that connected an existing main line to the Yucca Mountain site would have to be built or the material would have to be transferred to heavy-haul trucks at an intermodal transfer station and transported over existing highways that might need upgrading.

4.0 ENVIRONMENTAL CONSEQUENCES

As noted above, the waste management activities assessed in this EIS would occur in the Process Building, the Tank Farm, Waste Storage Areas, and the Radwaste Treatment System Drum Cell. This EIS also evaluates activities in the onsite facilities used to store and prepare wastes for shipping, including loading containerized wastes onto transportation vehicles.

The waste management actions proposed under all alternatives would be conducted in existing facilities (or in the case of waste transportation, on existing road and rail lines) by the existing work force and would not involve new construction or building demolition. As a result, the scope of potential impacts that could result from the proposed actions is limited. Specifically, because there would be no mechanism for new land disturbance under any alternative, there would be no potential to directly or indirectly impact current land use; biotic communities; cultural, historical, or archaeological resources; visual resources; threatened or endangered species or their critical habitats; wetlands; or floodplains. Additionally, because the work force requirements are assumed to be the same under all alternatives (for example there would be no increases or decreases from current employment levels), there would be no potential for socioeconomic impacts. Therefore, these elements of the affected environment would not be impacted by any actions proposed under the alternatives.

Moreover, none of the onsite management activities under any of the alternatives would result in any new criteria air pollutant emissions (nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, lead, and particulate matter). Impacts of criteria air pollutant emissions resulting from transportation activities are incorporated in the transportation analysis.

Consistent with DOE and Council on Environmental Quality NEPA guidance, the analysis of impacts focuses on those limited areas in which impacts may occur from any action proposed by the three alternatives assessed in this EIS. These areas are human health (including both onsite workers and the offsite public) and transportation. DOE also examined the potential for environmental justice impacts.

Human Health Impacts

Waste management activities under each alternative would result in the exposure of workers to radiation and contaminated material and exposure of the public to very small quantities of radioactive materials. Because the proposed waste management actions would involve only the storage, packaging, loading, and shipment of wastes, the proposed activities would result in a statistically insignificant contribution to the historically low impacts of ongoing WVDP operations. As a result, the human health impacts to involved and noninvolved workers and the public are dominated by ongoing WVDP site operations; therefore, there is little discernible difference in the impacts that could occur among the three alternatives. The potential human health impacts are summarized below and demonstrate that the impacts from normal operations of each alternative would result in less than 1 cancer fatality among workers or the public.

Measuring Radiation

The unit of radiation dose for an individual is the rem. A millirem (mrem) is 1/1,000 of a rem. The unit of dose for a population is person-rem and is determined by summing the individual doses of an exposed population. Dividing the person-rem estimate by the number of people in the population indicates the average dose that a single individual could receive. The potential impacts from a small dose to a large number of people can be approximated by the use of population (that is, collective) dose estimates.

Under the **No Action Alternative**, the worker population would receive a collective radiation dose of 150 person-rem, which would result in less than 1 (0.077) latent cancer fatality within that population. As under all alternatives, the population around the WVDP site would receive a collective radiation dose of 2.5 person-rem, which would result in less than 1 (1.5×10^{-3}) latent cancer fatality within that population. The maximally exposed individual located near the WVDP site would receive a total dose of 0.62 mrem over 10 years, which relates to a 3.7×10^{-7} probability (1 chance in 2.7 million) that this individual would incur a latent cancer fatality as a result of this exposure.

For **Alternative A**, the worker population would receive a collective radiation dose of 210 person-rem, which would result in less than 1 (0.11) latent cancer fatality within that population. The population around the WVDP site would receive a collective radiation dose of 2.5 person-rem, which would result in less than 1 (1.5×10^{-3}) latent cancer fatality within that population. The maximally exposed individual located near the WVDP site would receive a total dose of 0.62 mrem over 10 years, which relates to a 3.7×10^{-7} probability (1 chance in 2.7 million) that this individual would incur a latent cancer fatality as a result of this exposure.

For **Alternative B**, as would be the case under Alternative A, the worker population would receive a collective radiation dose of 210 person-rem, which would result in less than 1 (0.11) latent cancer fatality within that population. The population around the WVDP site would receive a collective radiation dose of 2.5 person-rem, which would result in less than 1 (1.5×10^{-3}) latent cancer fatality within that population. The maximally exposed individual located near the WVDP site would receive a total dose of 0.62 mrem over 10 years, which relates to a 3.7×10^{-7} probability (1 chance in 2.7 million) that this individual would incur a latent cancer fatality as a result of this exposure.

For all accidents under all alternatives, neither individual involved workers nor the maximally exposed individual, nor the general public near the WVDP site would be expected to incur a latent cancer fatality under any atmospheric conditions if an accident were to occur during waste management activities. Among the 12 accident scenarios evaluated, the projected latent cancer fatalities ranged from a high of 0.084 to a low of 4.5×10^{-6}. The frequencies of these accidents ranged from 0.1 to 10^{-8} per year. Using the screening procedure in *A Graded Approach for Evaluating Radiation Doses to Aquatic and*

Terrestrial Biota, the sum of fractions of the biota concentration guides for these accidents was less than 1. Therefore, the radioactive releases from these accidents are not likely to cause persistent, measurable, deleterious changes in populations or communities of terrestrial or aquatic plants or animals.

Transportation Impacts

Projected radiological and nonradiological impacts from routine, non-accident, offsite waste transportation were less than 1 latent cancer fatality among workers and the public for all three alternatives. Impact estimates from rail transportation were generally found to be slightly greater than, but similar to, the impacts from truck transportation. Impacts are also projected to be slightly greater for Alternative B due to the increased shipping required to move the TRU and HLW wastes to interim storage and subsequently to disposal locations.

Under the **No Action Alternative**, DOE would ship 4,100 cubic meters (145,000 cubic feet) of Class A LLW in 169 truck or 85 rail shipments. This would be expected to result in no fatalities, taking into account exposure to radiation and vehicle exhaust during incident-free shipping and traffic accidents not involving a release of radioactive material.

Latent Cancer Fatalities

Radiation can cause a variety of ill-health effects in people, including cancer. To determine whether health effects could occur as a result of radiation exposure from a particular activity and the extent of such effects, the radiation dose must be calculated. An individual may be exposed to radiation externally, through a radiation source outside of the body, and/or internally from ingesting or inhaling radioactive material. The dose is a function of the exposure pathway (for example, external exposure, inhalation, or ingestion) and the type and quantity of radionuclides involved.

After the dose is estimated, the potential health impact is calculated from current internationally recognized risk factors. The potential health impact for an individual, or the number of fatalities expected in a population, is stated in terms of the probability of a latent cancer fatality. A latent cancer fatality is a fatality resulting from a cancer that was originally induced by radiation but which may occur years after the exposure.

In an accident involving the release of radioactive material, the maximally exposed individual would receive a radiation dose of 4.6 rem from the maximum reasonably foreseeable transportation accident involving a truck shipment of Class A LLW. This is equivalent to a risk of a latent cancer fatality of about 2.8×10^{-3}. The probability of this accident is about 5×10^{-7} per year. The population would receive a collective radiation dose of about 1,300 person-rem from this truck accident involving Class A LLW. This could result in about 1 latent cancer fatality.

For the maximum reasonably foreseeable transportation rail accident involving Class A LLW, the maximally exposed individual would receive a radiation dose of about 9.2 rem. This is equivalent to a risk of a latent cancer fatality of about 5.5×10^{-3}. The probability of this accident is about 2×10^{-6} per year. The population would receive a collective radiation dose of about 2,600 person-rem from this rail accident involving Class A LLW. This could result in about 2 latent cancer fatalities.

Under **Alternative A**, DOE would ship about 21,000 cubic meters (742,000 cubic feet) of LLW, mixed LLW, TRU waste, and HLW canisters in 2,550 truck or 847 rail shipments over 10 years. These shipments would be expected to result in less than 1 fatality if either truck (0.79 – 0.82 fatality) or rail (0.60 – 0.68 fatality) shipments were used, taking into account exposure to radiation and vehicle exhaust during incident-free shipping and traffic accidents not involving a release of radioactive material.

For accidents in which the radioactive contents of the containers would be released, the maximally exposed individual would receive a radiation dose of about 25 rem from the maximum reasonably foreseeable truck or rail transportation accident with the highest consequences. This exposure is equivalent to a latent cancer fatality risk of 0.015. The population would receive a collective radiation

dose of approximately 6,600 person-rem from this accident. This could result in about 4 latent cancer fatalities. Because it is unlikely that a severe accident would breach multiple shipping containers, a single shipping container was assumed to be breached in the maximum reasonably foreseeable accident in either the truck or rail accident; therefore, the consequences for the truck or rail accident are the same. The probability of a truck accident is 6×10^{-7} per year and the probability of a rail accident is 1×10^{-7} per year.

Under **Alternative B**, DOE would load the same 21,000 cubic meters (742,000 cubic feet) at the WVDP site of LLW, mixed LLW, TRU waste, and HLW canisters in 2,550 truck or 847 rail shipments over 10 years as it would under Alternative A. However, the total shipments to disposal sites would be higher under Alternative B (3,120 truck shipments or 1,079 rail shipments), because TRU waste and HLW shipments include interim storage destinations. The total shipments would be expected to result in less than 1 fatality if either truck (0.84 – 0.93 fatality) or rail (0.66 – 0.79 fatality) shipments were used, taking into account exposure to radiation and vehicle exhaust during incident-free shipping and traffic accidents not involving a release of radioactive material.

For accidents in which the radioactive contents of the containers would be released, the maximally exposed individual would receive a radiation dose of about 25 rem from the maximum reasonably foreseeable truck or rail transportation accident with the highest consequences. This exposure is equivalent to a latent cancer fatality risk of 0.015. The population would receive a collective radiation dose of approximately 6,600 person-rem from this accident. This could result in about 4 latent cancer fatalities. Since one shipping container was assumed to be involved either the truck or rail accident, the consequences for the truck or rail accident are the same. The probability of a truck accident is 8×10^{-7} per year and the probability of a rail accident is 3×10^{-7} per year.

Using the screening procedure in *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota*, the sum of fractions of the biota concentration guides for the transportation accidents was less than 1. Therefore, the radioactive releases from the transportation accidents are not likely to cause persistent, measurable, deleterious changes in populations or communities of terrestrial or aquatic plants or animals.

Offsite Impacts

Impacts of waste management activities at offsite locations (Envirocare, Hanford, INEEL, NTS, ORNL, SRS, WIPP, and Yucca Mountain) have been addressed in earlier NEPA documents. For all waste types, WVDP waste represents less than 2 percent of the total DOE waste inventory. Human health impacts at all sites as a result of the management (storage or disposal) of WVDP during the 10-year period of analysis would be very minor (substantially less than 1 latent cancer fatality).

Environmental Justice

In accordance with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations,* and applicable guidance, DOE also considered whether there could be any disproportionately high and adverse human health or environmental impacts on minority or low-income populations surrounding the WVDP site as a result of the implementation of any of the alternatives analyzed. Analysis of environmental justice concerns was based on an assessment of the impacts reported. No high and adverse impacts were identified, even taking into account possible subsistence fishing on the part of some residents of the Cattaraugus Reservation of the Seneca Nation of Indians.

For offsite locations, the potential that low-income or minority populations could experience disproportionately high and adverse environmental consequences at sites where waste management

activities would occur was addressed in earlier NEPA documents. No such potential impacts were identified for any site.

Summary of Impacts

Tables S-2 and S-3 summarize the normal operational impacts for the 10-year period assessed in this EIS and potential accident impacts under the three alternatives analyzed in this EIS. Table S-4 summarizes the potential human health impacts at offsite locations.

5.0 CUMULATIVE IMPACTS

Past fuel reprocessing and radioactive waste disposal operations at the Center have resulted in airborne and liquid releases, some soil and groundwater contamination, limited sediment contamination in the creeks, and some detectible contamination off the site. The net impact from past operations to the regional population near the Center has been estimated to be approximately 13 person-rem. During reprocessing operations, the estimated cumulative exposure to the workforce was about 4,200 person-rem. The potential radiation dose to workers and the public from the implementation of Alternative A or B would be far lower than that experienced in the past and the resulting cumulative impacts would be very small.

There are ongoing operations at the WVDP site. These activities are those included in the No Action Alternative and Alternatives A and B and involve active hazardous waste management, operational support, surveillance, and oversight and other routine operations. These activities result in exposure of workers and the public to very low doses of radiation above background levels each year (0.1 percent of natural background annual exposure for the maximally exposed member of the public). The dose from ongoing operations, when added to the expected dose from the implementation of Alternative A or B, would remain very low.

No other ongoing or currently planned activities at the WVDP site would contribute to site cumulative impacts. There are no industrial facilities in the area that would present a hazard to WVDP or contribute to cumulative impacts. In the future, DOE or the NYSERDA may propose decommissioning and/or long-term stewardship activities that could impose environmental impacts at the site. However, at this time it is not known what, if any, contributions future decontamination and/or long-term stewardship actions may make to cumulative impacts.

It is reasonably foreseeable that waste generated as part of decommissioning and/or long-term stewardship activities would also be shipped offsite. Although the specific volume cannot be known at this time and would vary depending on the alternative selected, it is expected that the volume to be shipped offsite would be analyzed in the Decommissioning and/or Long-Term Stewardship EIS.

The shipment of radioactive wastes from WVDP to the disposal sites has the potential to affect people nationwide located along the highway and rail corridors between the site and the offsite disposal facilities. These potential impacts include the direct effect of radiation exposure to people using, working, and residing along the selected corridors and traffic accidents. Transportation workers and the general public using, working, and residing along the selected transportation corridors could also be affected by shipments of radioactive waste or materials from other sites. This situation would be particularly true for individuals residing along the major interstate highways used as access routes to the waste disposal sites. However, the potential cumulative impacts would be small. Further, there would be relatively few shipments of radioactive waste from WVDP to final disposal destinations (a maximum of 2,550 truck or 847 rail shipments under Alternative A or a maximum of 3,120 truck and 1,079 rail shipments under Alternative B), in comparison to other radioactive waste and materials shipments and truck shipments.

Table S-2. Summary of Normal Operational Impacts at West Valley

Impact Area	Unit of Measure	No Action Alternative	Alternative A - Preferred	Alternative B
Human Health Impacts[a]				
Public Impacts from Ongoing Operations				
MEI	LCF	3.7×10^{-7}	3.7×10^{-7}	3.7×10^{-7}
Population	LCF	1.5×10^{-3}	1.5×10^{-3}	1.5×10^{-3}
Worker Impacts				
Involved worker MEI	LCF	3.4×10^{-4}	1.3×10^{-3}	1.3×10^{-3}
Noninvolved worker MEI	LCF	3.0×10^{-4}	3.0×10^{-4}	3.0×10^{-4}
Involved worker population	LCF	2.1×10^{-3}	0.031	0.031
Noninvolved worker population	LCF	0.075	0.075	0.075
Total worker population	LCF	0.077	0.11	0.11
Transportation (from all causes – radiological and nonradiological; routine and accident conditions)				
Total	Shipments	169 (truck) 85 (rail)	2,550 (truck) 847 (rail)	3,120 (truck)[b] 1,079 (rail)[c]
Impacts				
Truck	Fatalities	0.034-0.041	0.79-0.82	0.84-0.93
Rail	Fatalities	0.042-0.049	0.60-0.68	0.66-0.79
Maximum Reasonably Foreseeable Accident				
Truck	LCF (probability)	1 (5×10^{-7})	4 (6×10^{-7})	4 (8×10^{-7})
Rail	LCF (probability)	2 (2×10^{-6})	4 (1×10^{-7})	4 (3×10^{-7})
Geology and Soils		No impact	No impact	No impact
Water Quality and Resources				
Groundwater		No impact	No impact	No impact
Surface water		No impact	No impact	No impact
Wetlands		No impact	No impact	No impact
Floodplains		No impact	No impact	No impact
Noise and Aesthetics		No impact	No impact	No impact
Ecological Resources				
Threatened and endangered species		No impact	No impact	No impact
Other plants and animals		No impact	No impact	No impact
Land Use		No impact	No impact	No impact
Socioeconomics		No impact	No impact	No impact
Environmental Justice		No impact	No impact	No impact
Cultural Resources		No impact	No impact	No impact

a. MEI = maximally exposed individual; LCF = latent cancer fatality (number of fatalities expected or probability).
b. Includes 270 TRU waste, and 300 HLW, truck shipments from interim storage to disposal. Alternative B would load the same number of truck shipments (2,550) at WVDP for shipment offsite as Alternative A.
c. Includes 172 TRU waste, and 60 HLW, rail shipments from interim storage to disposal. Alternative B would load the same number of rail shipments (847) at WVDP for shipment offsite as Alternative A.

Table S-3. Summary of Accident Impacts[a]

Accident	No Action Alternative[b]			Alternative A[b]			Alternative B[b]		
	Worker	MEI	Population[c]	Worker	MEI	Population[c]	Worker	MEI	Population[c]
	(LCF)			(LCF)			(LCF)		
Drum Puncture[d]	3.6×10^{-9}	1.4×10^{-9}	4.5×10^{-6}	6.0×10^{-8}	2.3×10^{-8}	7.2×10^{-5}	6.0×10^{-8}	2.3×10^{-8}	7.2×10^{-5}
Pallet Drop[d]	2.1×10^{-8}	8.4×10^{-9}	2.6×10^{-5}	3.5×10^{-7}	1.4×10^{-7}	4.4×10^{-4}	3.5×10^{-7}	1.4×10^{-7}	4.4×10^{-4}
Box Puncture[d]	4.3×10^{-8}	1.7×10^{-8}	5.4×10^{-5}	6.0×10^{-7}	2.3×10^{-7}	7.2×10^{-4}	6.0×10^{-7}	2.3×10^{-7}	7.2×10^{-4}
Drum Cell Drop	NA[g]	NA	NA	2.4×10^{-8}	9.6×10^{-9}	3.0×10^{-5}	2.4×10^{-8}	9.6×10^{-9}	3.0×10^{-5}
HIC[e] Drop	NA	NA	NA	7.5×10^{-7}	3.1×10^{-7}	9.6×10^{-4}	7.5×10^{-7}	3.1×10^{-7}	9.6×10^{-4}
CH-TRU Drum Puncture	NA	NA	NA	1.9×10^{-5}	7.8×10^{-6}	0.025	1.9×10^{-5}	7.8×10^{-6}	0.025
RHWF[f] Fire	NA	NA	NA	6.5×10^{-5}	2.6×10^{-5}	0.084	6.5×10^{-5}	2.6×10^{-5}	0.084
Collapse of Tank 8D-2 (Wet)[d]	1.2×10^{-6}	4.9×10^{-7}	1.5×10^{-3}	1.2×10^{-6}	4.9×10^{-7}	1.5×10^{-3}	1.2×10^{-6}	4.9×10^{-7}	1.5×10^{-3}
Collapse of Tank 8D-2 (Dry)[d]	1.4×10^{-6}	5.7×10^{-7}	1.8×10^{-3}	1.4×10^{-6}	5.7×10^{-7}	1.8×10^{-3}	1.4×10^{-6}	5.7×10^{-7}	1.8×10^{-3}

a. Based on atmospheric conditions (stability class and wind speed) that are not exceeded 50 percent of the time.
b. MEI = maximally exposed individual; LCF = latent cancer fatality (probability).
c. Collective dose to the 1.5 million people living within 80 kilometers (50 miles) of the WVDP site.
d. Ground-level release.
e. HIC = High integrity container.
f. RHWF = Remote-Handled Waste Facility.
g. NA = Not Applicable. Accident scenario could not occur under specified alternative.

Note: Of the 12 accidents analyzed, 5 could occur under any of the three alternatives and 7 could occur only under Alternatives A or B (see Appendix C). The accident impacts shown for the No Action Alternative primarily involve Class A LLW. The accident impacts shown for Alternatives A and B primarily involve Class C LLW.

Table S-4. Summary of Offsite Human Health Impacts

Site	No Action Alternative			Alternative A			Alternative B		
Envirocare[a]	Disposal of Class A LLW[b]			Disposal of LLW[c] and mixed LLW[d]			Disposal of LLW[c] and mixed LLW[d]		
	Worker	MEI	Population	Worker	MEI	Population	Worker	MEI	Population
	(LCF)			(LCF)			(LCF)		
	5.4×10^{-3}	6.9×10^{-6}	NA[e]	3.6×10^{-2}	5.1×10^{-5}	NA	3.6×10^{-2}	5.1×10^{-5}	NA
Hanford Site	Disposal of Class A LLW[b]			Disposal of LLW[c] and mixed LLW[d]			Disposal of LLW[c] and mixed LLW[d]		
	Worker	MEI	Population	Worker	MEI	Population	Worker	MEI	Population
	(LCF)			(LCF)			(LCF)		
	5.4×10^{-3}	6.9×10^{-6}	NA	3.6×10^{-2}	5.1×10^{-5}	NA	3.6×10^{-2}	5.1×10^{-5}	NA
							Interim Storage of TRU waste[f]		
							Worker	MEI	Population
							(LCF)		
							1.3×10^{-3}	3.4×10^{-8}	1.7×10^{-3}
							Interim Storage of HLW[g]		
							Worker	MEI	Population
							(LCF)		
							3.6×10^{-2}	NA	NA
INEEL	No activities			No activities			Interim Storage of TRU waste[f]		
							Worker	MEI	Population
							(LCF)		
							2.5×10^{-3}	5.1×10^{-8}	4.1×10^{-4}
NTS	Disposal of Class A LLW[b]			Disposal of LLW[c] and mixed LLW[d]			Disposal of LLW[c] and mixed LLW[d]		
	Worker	MEI	Population	Worker	MEI	Population	Worker	MEI	Population
	(LCF)			(LCF)			(LCF)		
	4.8×10^{-3}	3.0×10^{-16}	NA	3.2×10^{-2}	2.1×10^{-15}	NA	3.2×10^{-2}	2.1×10^{-15}	NA
ORNL	No activities			No activities			Interim Storage of TRU waste[f]		
							Worker	MEI	Population
							(LCF)		
							9.0×10^{-4}	1.4×10^{-8}	4.6×10^{-4}

Table S-4. Summary of Offsite Human Health Impacts (cont)

Site	No Action Alternative	Alternative A			Alternative B		
SRS	No activities	No activities			**Interim Storage of TRU waste[f]**		
					Worker	**MEI**	**Population**
					(LCF)		
					7.4×10^{-4}	2.1×10^{-10}	2.3×10^{-5}
					Interim Storage of HLW[g]		
					Worker	**MEI**	**Population**
					(LCF)		
					2.0×10^{-2}	NA	NA
WIPP	No activities	**Disposal of TRU waste[f]**			**Interim Storage of TRU waste[f]**		
		Worker	**MEI**	**Population**	**Worker**	**MEI**	**Population**
		(LCF)			**(LCF)**		
		1.0×10^{-2}	3.0×10^{-9}	3.0×10^{-6}	1.6×10^{-4}	6.9×10^{-7}	2.6×10^{-3}
					Disposal of TRU waste[f]		
					Worker	**MEI**	**Population**
					(LCF)		
					1.0×10^{-2}	3.0×10^{-9}	3.0×10^{-6}
Yucca Mountain Repository	No activities	**Disposal of HLW[g]**			**Disposal of HLW[g]**		
		Worker	**MEI**	**Population**	**Worker**	**MEI**	**Population**
		(LCF)			**(LCF)**		
		6.8×10^{-2}	3.1×10^{-7}	2.0×10^{-2}	6.8×10^{-2}	3.1×10^{-7}	2.0×10^{-2}

a. Impacts of disposal of Class A LLW and mixed LLW at Envirocare are assumed to be similar to impacts at Hanford.
b. The volume Class A LLW to be disposed of would be 145,000 cubic feet. To convert cubic feet to cubic meters, multiply by 0.028.
c. The volume of LLW to be disposed of would be 685,515 cubic feet. To convert cubic feet to cubic meters, multiply by 0.028.
d. The volume of mixed LLW to be disposed of would be 7,889 cubic feet. To convert cubic feet to cubic meters, multiply by 0.028.
e. NA = Not available.
f. The volume of TRU waste to be stored or disposed of would be 49,000 cubic feet. To convert cubic feet to cubic meters, multiply by 0.028.
g. The volume of HLW to be stored or disposed of is assumed to be 300 canisters for purposes of analysis; actual number of canisters is 275.

Sources: *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste,* DOE/EIS-0200-F (May 1997) and the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement,* DOE/EIS-0026-S-2 (September 1997).

Under Alternative A or B, there would be a very slight increase in radiation doses to the public and workers as a result of waste management activities, which could result in a very slight increase in excess cancer risk (approximately 1 in 3.3 million risk to the maximally exposed individual under both alternatives over 10 years). Offsite transportation of waste under Alternative A or B could also result in slight worker and public radiation exposure and the potential for traffic accident fatalities.

The actions contemplated in this EIS are also addressed in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (WM PEIS) (DOE/EIS-0200-F) and *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (WIPP Supplemental EIS II) (DOE/EIS-0026-S-2). These documents include analyses of impacts associated with transportation to the receiving sites identified in this EIS and potential cumulative impacts at DOE sites where WVDP waste would be stored or disposed of (see Section 1.7 of this EIS).

6.0 UNAVOIDABLE IMPACTS, SHORT-TERM USES AND LONG-TERM PRODUCTIVITY, AND IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

Implementation of Alternative A or B would not create a conflict between the local, short-term uses of the environment and long-term productivity. All activities would occur in existing or planned facilities or would use existing or planned infrastructure resources such as roads and railways. Environmental resources such as land use, plants and animals, and wetlands would not be affected by implementation of either action alternative.

The only irreversible or irretrievable commitment of resources that would occur if Alternative A or B were implemented is the use of fossil fuels in the shipment of waste off the site and the use of land for the disposal of radioactive wastes. Up to 2,550 truck or 847 rail shipments would be required to ship all existing and newly generated LLW, mixed LLW, TRU waste, and HLW canisters off the site under Alternatives A and B, with an additional 570 truck or 232 rail shipments required to ship TRU wastes and HLW from interim storage locations to disposal sites under Alternative B. Both rail and truck shipments would require the consumption of diesel fuel and other fossil fuels such as gasoline and lubricants.

Implementation of Alternative A or B would also involve the use of offsite land previously committed for radioactive waste disposal facilities. The land-use requirements for the offsite disposal of LLW, mixed LLW, and TRU waste have been addressed in the WM PEIS and WIPP Supplemental EIS II. Land-use requirements for the offsite disposal of HLW are addressed in the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250). This document is incorporated by reference.

7.0 CONCLUSION

Based on the analysis of the potential impacts documented in this EIS, DOE finds that implementation of any of the alternatives would result in very small impacts to human health or the environment. DOE also concludes that no disproportionately high and adverse human health or environmental impacts would be imposed on minority or low-income populations surrounding the WVDP site or DOE sites where WVDP waste would be stored or disposed of as a result of the implementation of any of the alternatives analyzed.

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