CHAPTER 1
INTRODUCTION AND PURPOSE AND NEED

1.0 INTRODUCTION AND PURPOSE AND NEED

Chapter 1 of this *Draft Surplus Plutonium Disposition Supplemental Environmental Impact Statement (SPD Supplemental EIS)* (DOE/EIS-0283-S2) describes the purpose and need for agency action, introduces the proposed action and alternatives, and summarizes the scoping process for this document. This chapter also describes the amounts of surplus plutonium addressed and the decisions that could be made following completion of this *SPD Supplemental EIS*.

1.1 Introduction

In keeping with U.S. nonproliferation policies and commitments[1] to reduce the availability of material that is readily usable in nuclear weapons, the U.S. Department of Energy (DOE), including the semiautonomous National Nuclear Security Administration (NNSA), is engaged in a program to disposition U.S. surplus weapons-usable plutonium (referred to in this supplemental environmental impact statement as "surplus plutonium"). Surplus plutonium includes pit[2] and non-pit[3] plutonium that is no longer needed for U.S. national security or programmatic purposes. DOE has previously analyzed and made decisions on disposition paths for most of the plutonium the United States has declared surplus (see Section 1.5).

Weapons-usable plutonium is plutonium in forms that can be readily converted for use in nuclear weapons. Weapons-grade, fuel-grade, and power-reactor-grade plutonium are all weapons-usable plutonium.

Surplus plutonium has no identified programmatic use and does not fall into one of the categories of national security reserves.

On March 28, 2007, DOE published a Notice of Intent (NOI) in the *Federal Register* (72 FR 14543) to prepare this *Surplus Plutonium Disposition Supplemental Environmental Impact Statement (SPD Supplemental EIS)*[4] to evaluate the potential environmental impacts at the Savannah River Site (SRS) of alternative disposition pathways for surplus plutonium originally planned for immobilization in the Record of Decision (ROD) (65 FR 1608) for the *Surplus Plutonium Disposition Environmental Impact Statement (SPD EIS)* (DOE 1999b). The proposed actions and alternatives included construction and operation of a new vitrification capability in K-Area, processing in H-Canyon/HB-Line and the Defense Waste Processing Facility (DWPF), and fabricating mixed oxide (MOX) fuel in the MOX Fuel Fabrication Facility (MFFF) currently under construction in F-Area at SRS.

Then on July 19, 2010, DOE issued an amended NOI (75 FR 41850) announcing its intent to modify the scope of this *SPD Supplemental EIS* and to conduct additional public scoping. Under the revised scope, DOE would refine the quantity and types of surplus plutonium, evaluate additional alternatives, and no longer consider in detail one of the alternatives identified in the 2007 NOI (i.e., ceramic can-in-canister immobilization). In addition, DOE had identified in the 2007 NOI a glass can-in-canister immobilization

[1] *On September 1, 2000, the Agreement Between the Government of the United States and the Government of the Russian Federation Concerning the Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes and Related Cooperation (referred to as "the PMDA") (USA and Russia 2000) was signed. The PMDA (and its 2010 Protocol) calls for each country to dispose of at least 34 metric tons (37 tons) of excess weapons grade plutonium by fabrication into MOX fuel and irradiation in reactors in each country.*

[2] *The plutonium was made by the United States in nuclear reactors for use in nuclear weapons. A pit is the central core of a primary assembly in a nuclear weapon and is typically composed of plutonium-239 metal, enriched uranium, or both, and other materials.*

[3] *Non-pit plutonium may exist in metal or oxide form, and may be combined with other materials that were used in the process of manufacturing plutonium for use in nuclear weapons or related research and development activities. Most surplus non-pit plutonium is currently stored at the Savannah River Site.*

[4] *In the NOI (72 FR 14543), the title was given as the "Supplemental Environmental Impact Statement for Surplus Plutonium Disposition at the Savannah River Site."*

approach as its Preferred Alternative for the non-pit plutonium then under consideration; the 2010 amended NOI explained that DOE would evaluate a glass can-in-canister immobilization alternative in this *SPD Supplemental EIS*, but that DOE did not have a preferred alternative.

On January 12, 2012, DOE issued a second amended NOI (77 FR 1920) announcing its intent to further modify the scope of this *SPD Supplemental EIS* to evaluate additional options for pit disassembly and conversion of plutonium metal to oxide, including potential use of the Plutonium Facility (PF-4) at the Los Alamos National Laboratory (LANL), and to conduct additional public scoping. In addition, DOE identified the MOX Fuel Alternative as DOE's Preferred Alternative.

This *SPD Supplemental EIS* updates the previous DOE National Environmental Policy Act (NEPA) analyses (described in Appendix A, Section A.1) to consider options for pit disassembly and conversion of plutonium metal to oxide. It also analyzes the use of fuel fabricated from surplus plutonium in Tennessee Valley Authority (TVA) reactors and other domestic commercial nuclear power reactors[5] to generate electricity. This *SPD Supplemental EIS* also evaluates alternatives for the disposition of 13.1 metric tons (14.2 tons) of surplus plutonium for which DOE has not yet made a disposition decision.

1.2 Purpose of and Need for Agency Action

DOE's purpose and need for action remains, as stated in the *SPD EIS* (DOE 1999b:1-3), to reduce the threat of nuclear weapons proliferation worldwide by conducting disposition of surplus plutonium in the United States in an environmentally sound manner, ensuring that it can never again be readily used in nuclear weapons.

TVA is a cooperating agency on this *SPD Supplemental EIS* because it is considering the use of MOX fuel, produced as part of DOE's Surplus Plutonium Disposition Program, in its nuclear power reactors. TVA provides electrical power to the people of the Tennessee Valley region, including almost all of Tennessee and parts of Alabama, Mississippi, Kentucky, Virginia, North Carolina, and Georgia. TVA's Sequoyah and Browns Ferry Nuclear Plants, located near Soddy-Daisy, Tennessee and Athens, Alabama, respectively, currently are, and will continue to be, major assets among TVA's energy generation resources in meeting the demand for power in the region. Consistent with DOE's purpose and need, TVA's purpose for considering use of MOX fuel derived from DOE's Surplus Plutonium Disposition Program is the possible procurement of MOX fuel for use in these reactors.

Cooperating Agency

A cooperating agency participates in the preparation of an environmental impact statement because of its jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) (40 CFR 1501.6, 1508.5).

1.3 Proposed Action

DOE proposes to disposition an additional 13.1 metric tons (14.4 tons) of surplus plutonium for which it has not previously made a disposition decision; to provide the appropriate capability to disassemble surplus pits and convert surplus plutonium to a form suitable for disposition; and to provide for the use of MOX fuel in TVA and other domestic commercial nuclear power reactors.

Figure 1–1 shows the major Surplus Plutonium Disposition Program activities. Facilities at E-, F-, H-, K-, and S-Areas at SRS in South Carolina; at Technical Area 55 (TA-55) at LANL in New Mexico; at the Waste Isolation Pilot Plant (WIPP) in New Mexico; and at the Browns Ferry and Sequoyah Nuclear Plants and other domestic commercial nuclear power reactors that could irradiate MOX fuel. **Figures 1–2 and 1–3** show the locations of SRS and LANL and the applicable operations areas at these sites. **Figures 1–4, 1–5, and 1–6** show the locations of WIPP, the Browns Ferry Nuclear Plant, and the Sequoyah Nuclear Plant, respectively.

[5] *Other domestic commercial nuclear power reactors are evaluated in this* SPD Supplemental EIS *by way of analyzing a "generic reactor" reflecting characteristics of such reactors.*

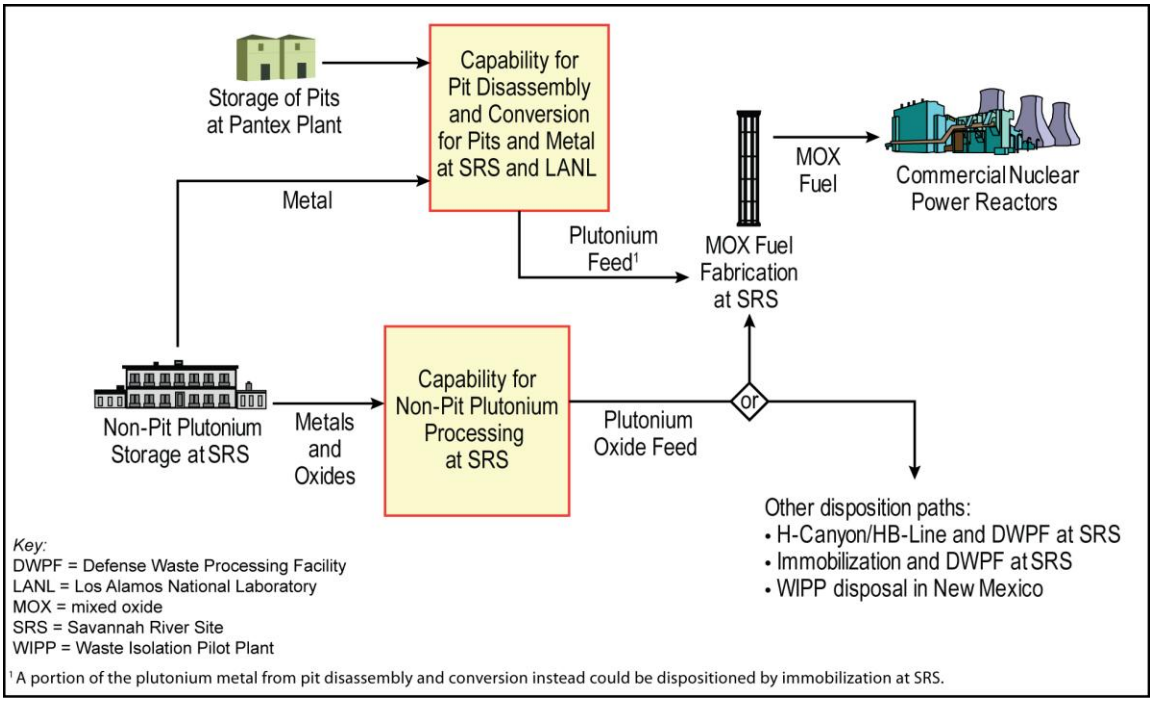

Figure 1–1 Surplus Plutonium Disposition Program Activities

1.4 Alternatives Evaluated

In addition to a No Action Alternative, in this *SPD Supplemental EIS* DOE evaluates four action alternatives. The alternatives are based on four options for disposition of 13.1 metric tons (14.4 tons) of surplus plutonium for which DOE has not yet selected a disposition pathway, and include from one to four applicable options for pit disassembly and conversion.[6] The alternatives are briefly described below (Chapter 2, Section 2.3, describes the alternatives in more detail):

(1) *No Action Alternative* – continued storage of 7.1 metric tons (7.8 tons) of pit plutonium at the Pantex Plant (Pantex), and 6 metric tons (6.6 tons) of non-pit plutonium at SRS

(2) *Immobilization to DWPF Alternative* – glass can-in-canister immobilization for both surplus non-pit and disassembled and converted pit plutonium and subsequent filling of the canister with high-level radioactive waste (HLW) at DWPF

(3) *MOX Fuel Alternative* – fabrication of the disassembled and converted pit plutonium and much of the non-pit plutonium into MOX fuel at MFFF for use in domestic commercial nuclear power reactors to generate electricity and disposition of the surplus non-pit plutonium that is not suitable for MFFF as transuranic (TRU) waste at WIPP, a deep geologic repository in southeastern New Mexico

(4) *H-Canyon/HB-Line to DWPF Alternative* – processing the surplus non-pit plutonium in the existing H-Canyon/HB-Line at SRS and subsequent disposal with HLW (i.e., vitrification in the existing DWPF), and fabrication of the pit plutonium into MOX fuel at MFFF

(5) *WIPP Alternative* – disposal of the surplus non-pit plutonium as TRU waste at WIPP and fabrication of the pit plutonium into MOX fuel at MFFF

[6] *In the 2000 ROD (65 FR 1608) for the* SPD EIS, *DOE decided to construct and operate a Pit Disassembly and Conversion Facility at SRS. However, as described in DOE's amended NOIs issued in 2010 (75 FR 41850) and 2012 (77 FR 1920). DOE is revisiting this decision.*

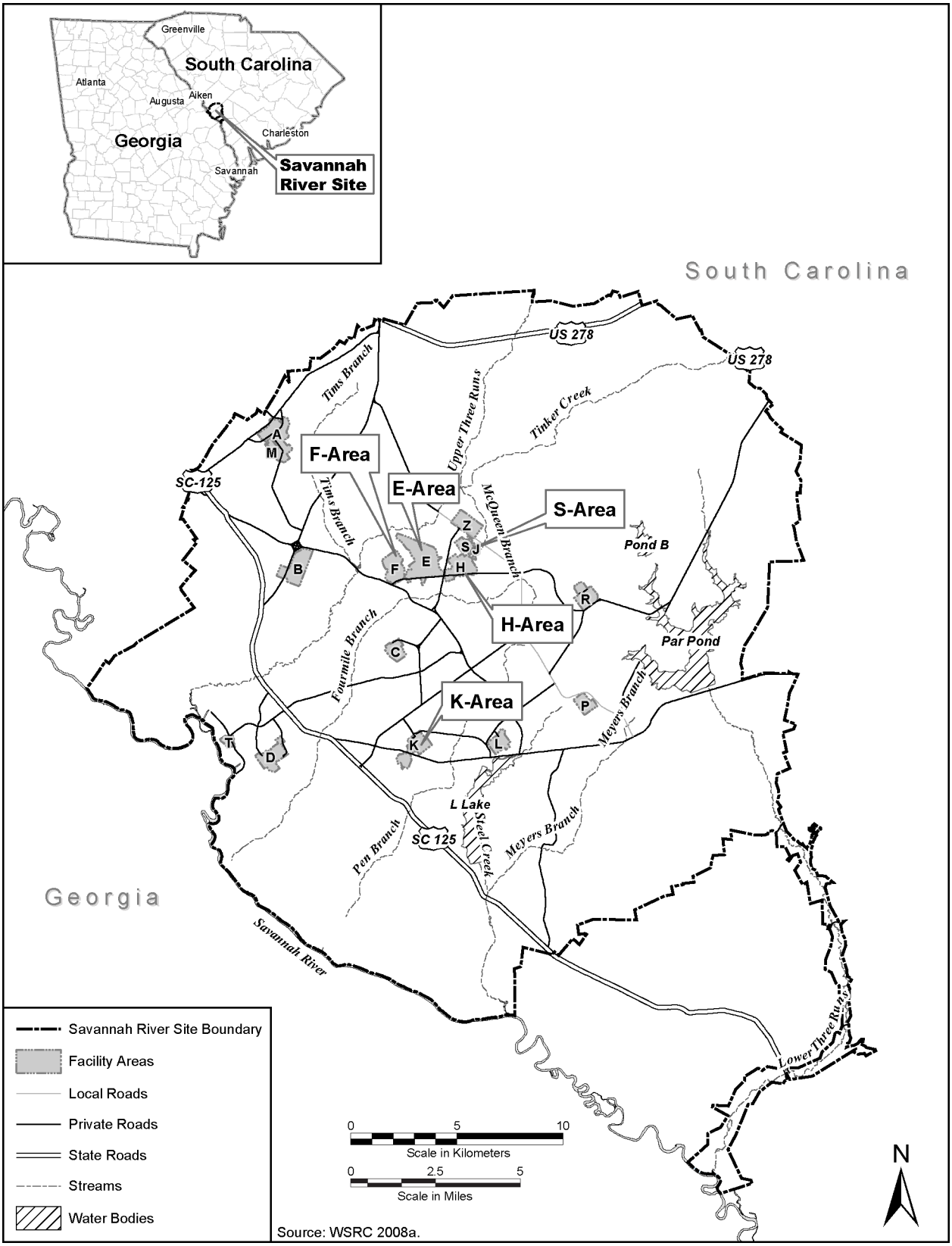

Figure 1–2 Savannah River Site Location and Operations Areas

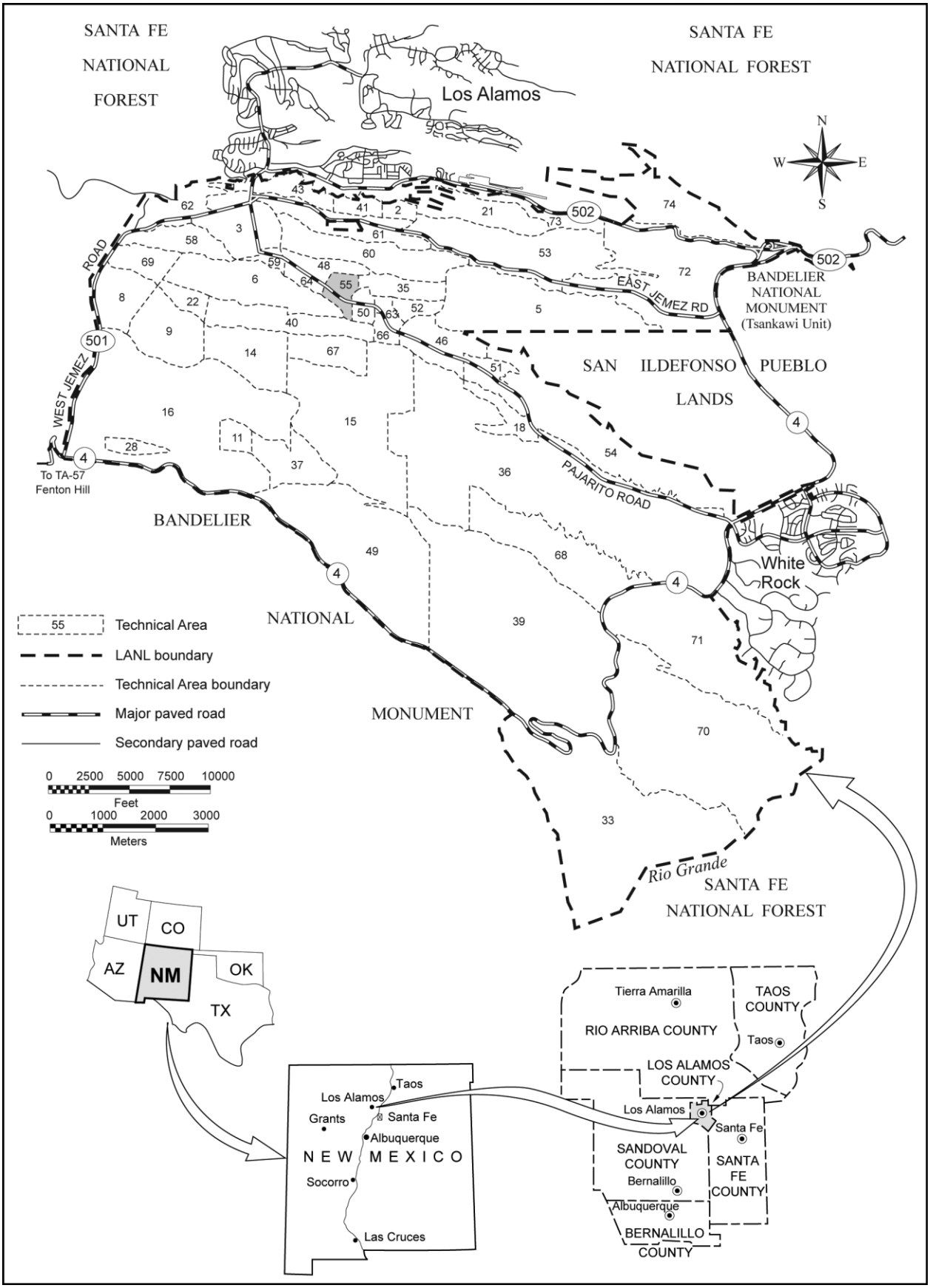

Figure 1–3 Los Alamos National Laboratory Location and Technical Areas

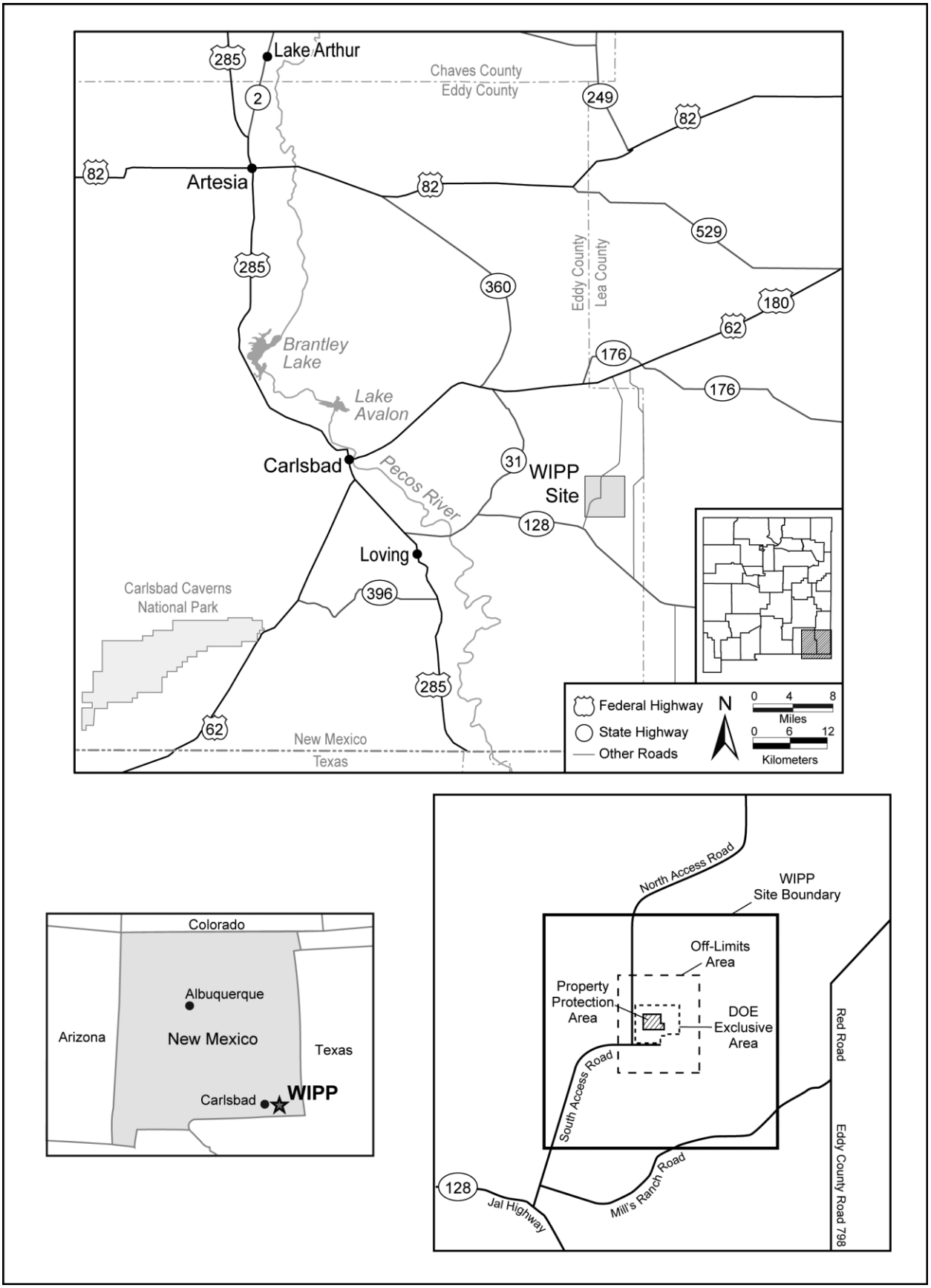

Figure 1–4 Waste Isolation Pilot Plant Location

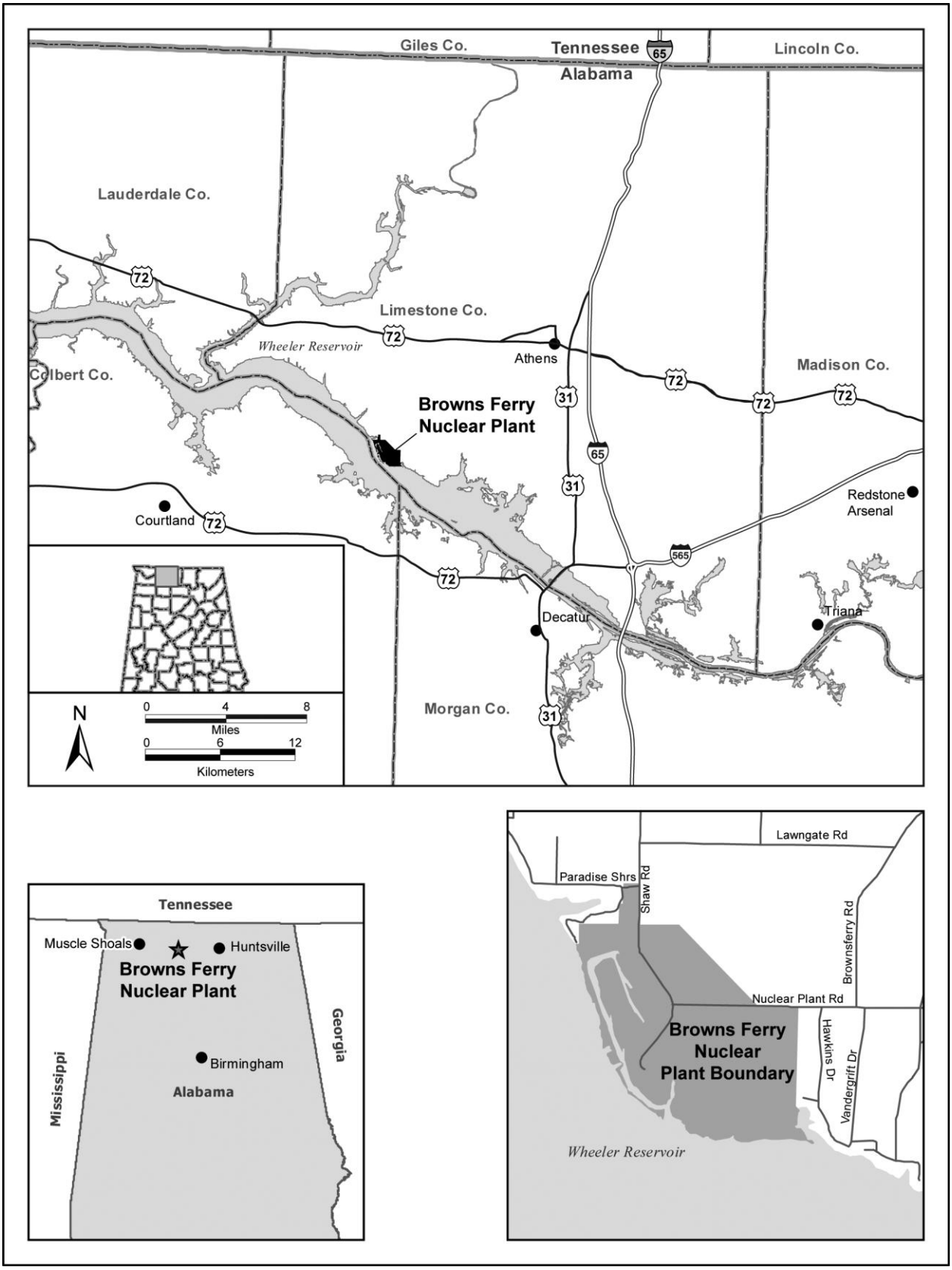

Figure 1–5 Browns Ferry Nuclear Plant Location

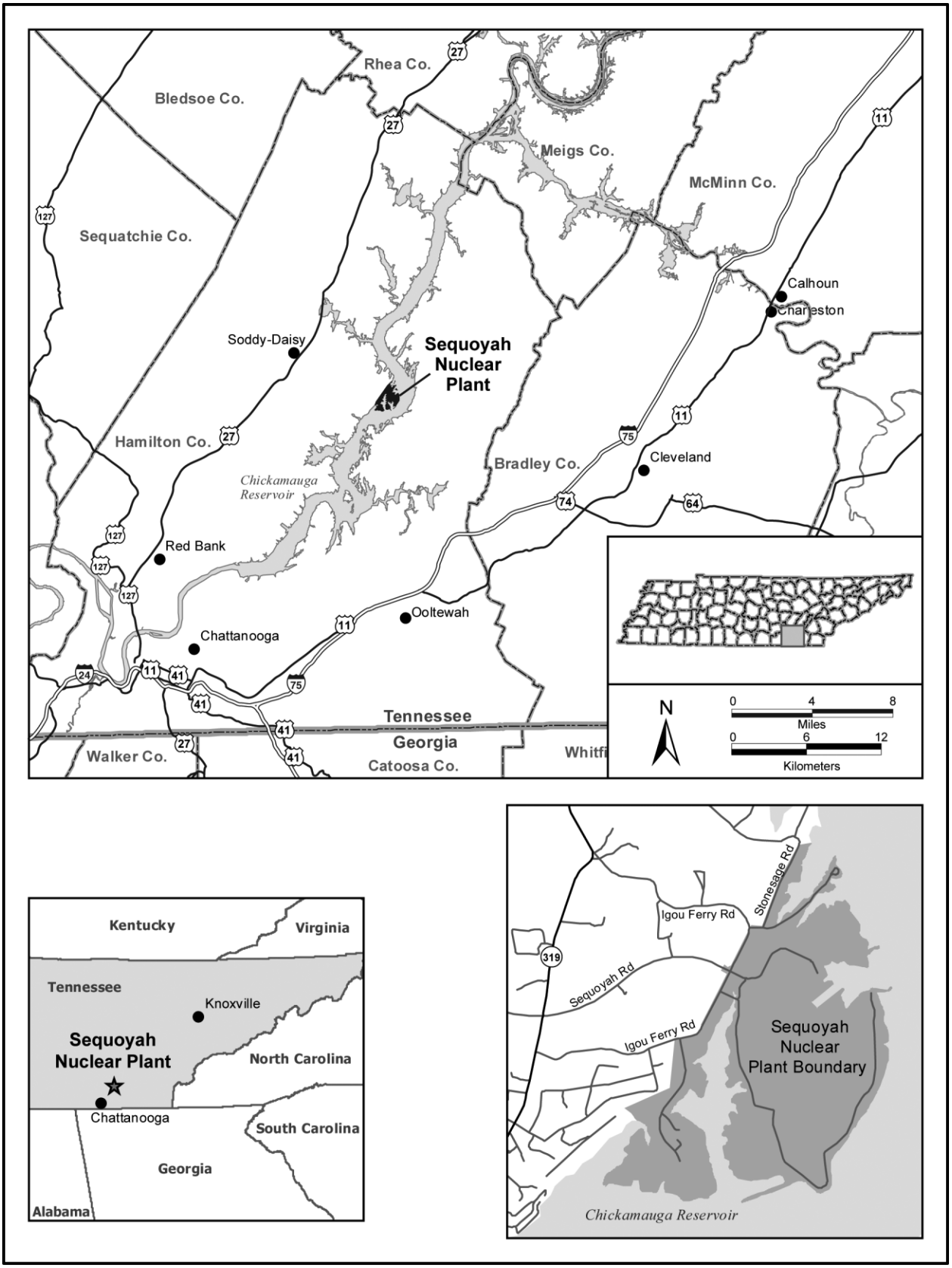

Figure 1–6 Sequoyah Nuclear Plant Location

For brevity, the pit disassembly and conversion and plutonium disposition options are not described here, but are described in Chapter 2, Sections 2.1 and 2.2, respectively. Under all alternatives, DOE would also disposition as MOX fuel 34 metric tons (37.5 tons) of surplus plutonium in accordance with previous decisions. The 34 metric tons (37.5 tons) of plutonium would be fabricated into MOX fuel at MFFF, as described in Section 2.2.2, for use in domestic commercial nuclear power reactors.

1.5 Disposition Paths for Surplus Plutonium

To date, the United States has declared as excess to U.S. defense needs a total of 61.5 metric tons (67.8 tons) of plutonium. This quantity includes both pit and non-pit plutonium. Based on a series of NEPA reviews (described in Appendix A, Section A.1), DOE has determined disposition paths for most of this surplus plutonium.

1.5.1 Plutonium with Identified Disposition Paths

Figure 1–7 summarizes the various plutonium disposition paths decided to date for 45.3 metric tons (50.0 tons) of surplus plutonium.

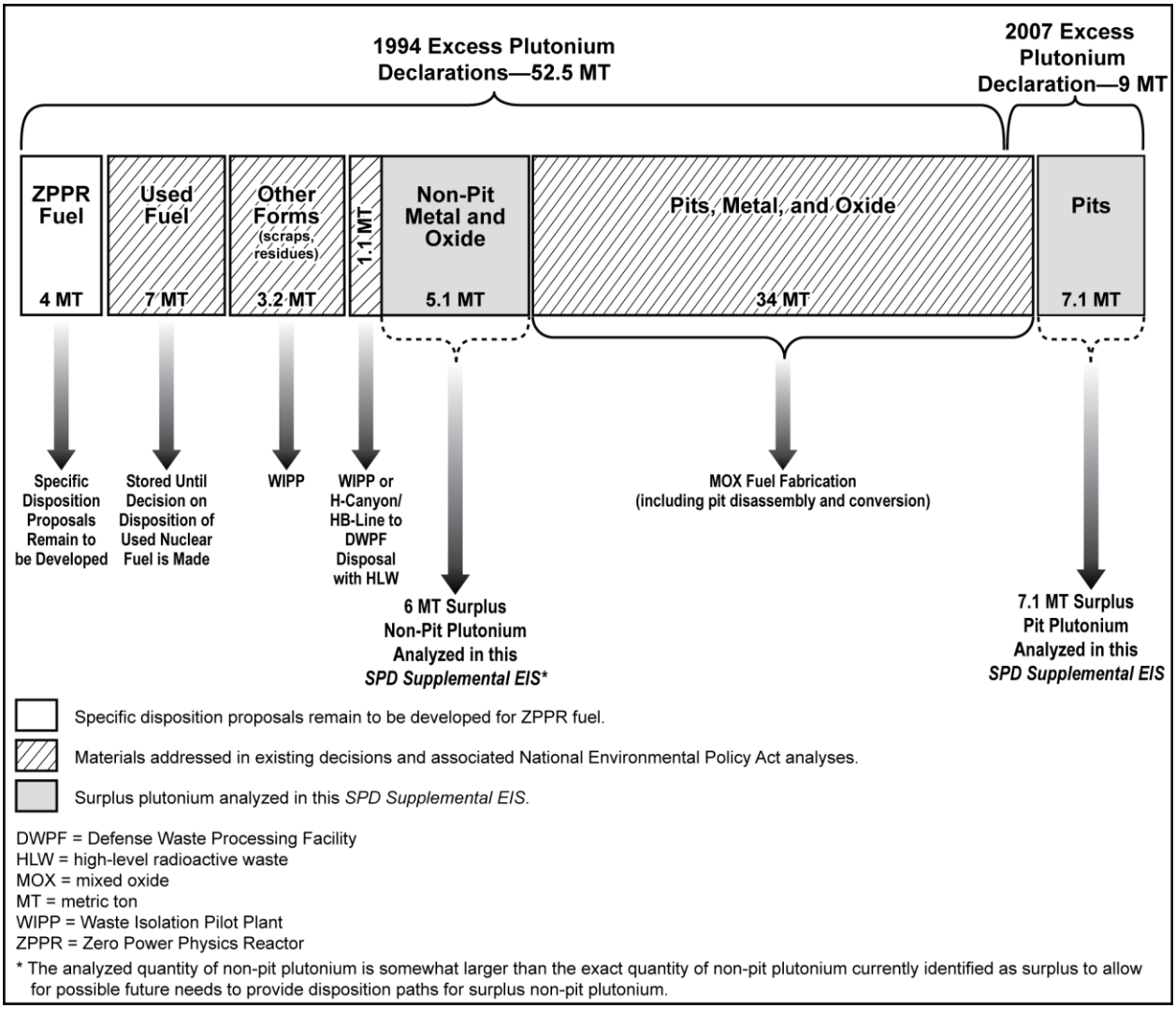

Figure 1–7 Disposition Paths for Surplus Plutonium

In the 2000 ROD (65 FR 1608) and 2003 amended ROD (68 FR 20134) for the *SPD EIS*, DOE decided to convert 34 metric tons (37.5 tons) of surplus plutonium into MOX fuel at an MFFF currently being constructed at SRS. DOE is not revisiting those decisions. However, DOE is revisiting its Pit Disassembly and Conversion Facility (PDCF) decision, and a total of 35 metric tons (38.6 tons) is analyzed for all pit disassembly and conversion options. Regardless of the disposition alternative selected, pit disassembly and conversion would be necessary for 35 metric tons (38.6 tons) of surplus plutonium.

Seven metric tons (7.7 tons) of surplus plutonium are contained in used reactor fuel (used fuel is also known as spent fuel) and are, therefore, already in a proliferation-resistant form. Following appropriate NEPA reviews as described in Appendix A, Section A.1, DOE has already disposed of 3.2 metric tons (3.5 tons) of surplus plutonium scrap and residues at WIPP as TRU waste. In 2008 and 2009, DOE completed interim action determinations concluding that 0.6 metric tons (0.7 tons) of surplus non-pit plutonium could be disposed of through H-Canyon/HB-Line and DWPF (DOE 2008g, 2009b); in 2011, DOE amended this determination to add WIPP as a disposal alternative for about 85 kilograms (187 pounds) of these 0.6 metric tons (0.7 tons) (DOE 2011c). Also in 2011, DOE decided to use H-Canyon/HB-Line to prepare 0.5 metric tons (0.6 tons) of surplus plutonium for disposal at WIPP (DOE 2011f). Thus, DOE has determined that a total of 1.1 metric tons (1.2 tons) of surplus plutonium could be dispositioned through H-Canyon/HB-Line to DWPF and WIPP.

1.5.2 Plutonium with No Identified Disposition Path

Figure 1–7 shows the surplus plutonium for which DOE has not made a disposition decision. Of this material, DOE previously set aside for programmatic use 4 metric tons (4.4 tons) of surplus plutonium in the form of Zero Power Physics Reactor fuel at its Idaho National Laboratory. The DOE program for which this material was set aside no longer has a programmatic use for the material. DOE is considering using a portion (about 0.4 metric tons [0.44 tons]) of the material for a different programmatic use. While the bulk of the Zero Power Physics Reactor fuel currently stored at the Idaho National Laboratory has been declared excess, specific disposition proposals remain to be developed.

Therefore, DOE currently proposes to make decisions regarding the disposition of 13.1 metric tons (14.4 tons) of surplus plutonium (i.e., 7.1 metric tons [7.8 tons] of pit plutonium[7] and 6 metric tons [6.6 tons] of non-pit plutonium[8]). The 6 metric tons (6.6 tons) of non-pit plutonium include a limited quantity of additional plutonium (0.9 metric tons [1.0 ton]), to allow for the possibility that DOE may, in the future, identify additional quantities of surplus plutonium that could be processed for disposition through the facilities and capabilities analyzed in this *SPD Supplemental EIS*. For example, future sources of additional surplus plutonium could include additional plutonium quantities recovered from foreign locations through NNSA's Global Threat Reduction Initiative[9] or future quantities of plutonium declared excess to U.S. defense needs.

[7] *The 34 metric tons (37 tons) previously identified for MOX fuel fabrication included an allowance of 1.9 metric tons (2.1 tons) for future declarations. DOE later determined, as shown in Figure 1–7, that 1.9 metric tons (2.1 tons) from the 9 metric tons (9.9 tons) of pit plutonium in the 2007 declaration qualified for inclusion within the 34 metric tons (37 tons) identified for MOX fabrication, leaving 7.1 metric tons (7.8 tons) of pit plutonium to be dispositioned.*

[8] *The analyzed quantity of non-pit plutonium is somewhat larger than the exact quantity of non-pit plutonium currently identified as surplus (6 metric tons [6.6 tons] compared to 5.1 metric tons [5.6 tons]) to allow for possible future needs to provide disposition paths for surplus non-pit plutonium. This quantity also includes 0.7 metric tons (0.77 tons) of unirradiated Fast Flux Test Facility fuel.*

[9] *As analyzed in the Environmental Assessment for the U.S. Receipt and Storage of Gap Material Plutonium and Finding of No Significant Impact (DOE 2010b).*

1.6 Public Scoping

Since announcement of this *SPD Supplemental EIS*, DOE has provided three opportunities for the public to provide scoping comments (2007 [72 FR 14543]; 2010 [75 FR 41850]; and 2012 [77 FR 1920]). The public scoping periods extended from March 28, 2007, through May 29, 2007; July 19, 2010 through September 17, 2010; and January 12, 2012 through March 12, 2012. Scoping meetings were conducted on April 17, 2007, in Aiken, South Carolina; April 19, 2007, in Columbia, South Carolina; August 3, 2010, in Tanner, Alabama; August 5, 2010, in Chattanooga, Tennessee; August 17, 2010, in North Augusta, South Carolina; August 24, 2010, in Carlsbad, New Mexico; August 26, 2010, in Santa Fe, New Mexico; and February 2, 2012, in Pojoaque, New Mexico. This section summarizes issues raised and comments received during the public scoping periods. A more detailed summary of the comments received during the public scoping periods is available on the project website at http://nnsa.energy.gov/nepa/spdsupplementaleis.

Comment Summary: One commentor recounted the history of the plutonium declared surplus during the Clinton Administration and requested that DOE reconcile the quantities of plutonium by form and proposed disposition pathway.

Response: The quantities of plutonium that are analyzed in this *SPD Supplemental EIS* are described in Section 1.5. Figure 1–7 summarizes the disposition paths for surplus plutonium.

Comment Summary: A commentor asked about DOE's plan for additional plutonium disposition as the Nation's nuclear weapons stockpile is retired.

Response: As described in Section 1.5, the scope of this *SPD Supplemental EIS* is limited to 13.1 metric tons (14.4 tons) of additional surplus plutonium. Additional future declarations related to nuclear weapons stockpile retirement would be subject to appropriate NEPA review before a disposition path could be selected.

Comment Summary: Commentors were concerned about the composition of the surplus plutonium and where it is currently stored.

Response: DOE has information on the composition of all pit and non-pit plutonium. This information is sensitive and, therefore, has not been included in this *SPD Supplemental EIS*. As described in Chapter 2, Section 2.3.1, plutonium pits are safely stored at Pantex near Amarillo, Texas, and most surplus non-pit plutonium is in safe storage at the K-Area Complex at SRS; the remaining surplus non-pit plutonium is in the process of being moved to SRS, and in the interim, is safely stored at other DOE sites.

Comment Summary: Commentors were concerned that related environmental impact statements (EISs) need to be updated before this *SPD Supplemental EIS* is issued and a decision made.

Response: This *SPD Supplemental EIS* is being prepared in accordance with applicable Council on Environmental Quality and DOE NEPA regulations. This *SPD Supplemental EIS* addresses all of the relevant issues and analysis covered in the other documents and updates the analyses where necessary. The other related EISs and supplement analyses, and the decisions announced in the RODs for these documents, remain valid and, and in accordance with Council on Environmental Quality and DOE NEPA regulations, do not need to be updated before this *SPD Supplemental EIS* can be issued.

Comment Summary: Commentors variously supported or opposed the individual surplus plutonium disposition options constituting the proposed alternatives. Commentors asked DOE to reconsider previous decisions, including fabrication of 34 metric tons (37 tons) of surplus plutonium into MOX fuel; the Preferred Alternative (MOX Fuel Alternative); eliminating the ceramic immobilization disposition option; and eliminating the disassembly of pits at Pantex. Some commentors supported the

immobilization option, including extending it to the entire surplus plutonium inventory. A commentor asked that alternative approaches to surplus plutonium disposition be considered, including quicker, less costly methods.

Response: Although DOE has announced a Preferred Alternative (see Chapter 2, Section 2.5), DOE has not made a decision with respect to the surplus plutonium analyzed in this *Draft SPD Supplemental EIS* and could select one of the other alternatives or a combination of alternatives. Chapter 2, Section 2.3, describes the alternatives evaluated in this *SPD Supplemental EIS*, and Section 2.4 describes the alternatives considered, but dismissed from detailed study. As summarized in Section 2.4, the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement (Storage and Disposition PEIS)* (DOE 1996c) and the *SPD EIS* (DOE 1999b) considered numerous alternatives for surplus plutonium disposition, including immobilization of the entire surplus plutonium inventory and pit disassembly and conversion at Pantex. Immobilization of the entire surplus plutonium inventory was evaluated in the *SPD EIS* (DOE 1999b), and DOE selected the MOX approach for some of the material declared surplus for reasons set forth in the *SPD EIS* ROD (65 FR 1608). DOE is not revisiting the decisions announced in that ROD, or in the 2002 and 2003 amended RODs (67 FR 19432 and 68 FR 20134), other than the decision to construct and operate a stand-alone PDCF. Although DOE is reconsidering the decision to build PDCF at SRS and is looking at other options, including using PF-4 at LANL, DOE is not reconsidering its prior decision to not construct a pit disassembly and conversion capability at Pantex, an alternative considered in the *SPD EIS*.

Comment Summary: A comment was made that the proposed processing of some of the plutonium through H-Canyon as identified in the NOI should be considered a separate alternative.

Response: As described in Chapter 2, Section 2.3.4, a separate H-Canyon/HB-Line to DWPF Alternative is evaluated.

Comment Summary: Commentors requested that DOE explain why disposal at WIPP is a reasonable alternative. Some commentors expressed concerns about sending plutonium to WIPP.

Response: The direct disposal of 50 metric tons (55 tons) of surplus plutonium was eliminated from further analysis in the *Storage and Disposition PEIS* because it would exceed the capacity of WIPP when added to DOE's inventory of TRU waste (DOE 1996c:2-13). The disposal at WIPP of up to 6 metric tons (6.6 tons) of non-pit plutonium, which is approximately 12 percent of the amount considered in the *Storage and Disposition PEIS*, would not exceed WIPP's capacity and, therefore, was considered to be a reasonable alternative in this *SPD Supplemental EIS*. A description of WIPP's capacity and the process that would be used to dispose of surplus plutonium as TRU waste at WIPP is contained in Appendix B, Sections B.1.3 and B.3; the environmental impacts of shipping waste to WIPP are described in Appendix E.

Comment Summary: Commentors were concerned that plutonium disposal at WIPP is an affirmation that disposal of plutonium utilizing the Spent Fuel Standard, by which plutonium is placed in a material with a radiation barrier, is essentially dead.

Response: DOE believes that the alternatives, including the WIPP Alternative, analyzed in this *SPD Supplemental EIS* provide protection from theft, diversion, or future reuse in nuclear weapons akin to that afforded by the Spent Fuel Standard.

Comment Summary: Commentors requested that this *SPD Supplemental EIS* reanalyze the impacts of plutonium storage at the K-Area Complex.

Response: The impacts of long-term storage of plutonium at the K-Area Complex are presented in Appendix H of this *SPD Supplemental EIS*.

Comment Summary: Hardened storage should be analyzed for immobilized wastes to protect them from risks posed by natural or manmade disasters and terrorist attack.

Response: As described in Appendix B, Section B.1.4.1, canisters containing cans of immobilized surplus plutonium would be filled with HLW and stored in the Glass Waste Storage Buildings at SRS. These buildings have controls and engineered safeguards required by safety assessments that examine the potential for, and consequences of, accidents caused by natural phenomena and manmade events. The presence of immobilized plutonium in the canisters is not expected to appreciably change their performance in severe accidents and these wastes would not be considered an attractive target for terrorist attack. DOE considers risks associated with security and safety to determine whether or not a hardened structure is required. DOE does not believe that additional hardening of the Glass Waste Storage Buildings is needed to safely store immobilized waste containing surplus plutonium.

Comment Summary: Commentors expressed concern over the MOX fuel fabrication program, including the lack of interest in MOX fuel of commercial nuclear power plant operators; cost and schedule; and tying U.S. disposition activities to the Russian government's nuclear activities.

Response: MOX fuel use in commercial reactors is a demonstrated technology that has been used worldwide for over 40 years. DOE continues to pursue potential domestic commercial nuclear power customers. MFFF will start up using existing surplus plutonium oxide supplies and will be built and operated as described in Appendix B, Section B.1.1.2, and Chapter 5, Section 5.3.2, of this *SPD Supplemental EIS*. The United States remains committed to the Agreement Between the Government of the United States of America and the Government of the Russian Federation Concerning the Management and Disposition of Plutonium Designated As No Longer Required for Defense Purposes and Related Cooperation (referred to as the "PMDA"), under which both the United States and the Russian Federation have each agreed to dispose of at least 34 metric tons (37.5 tons) of excess weapons-grade plutonium in nuclear reactors to produce electricity. It is important that MFFF begin operations to demonstrate progress to the Russian government, meet U.S. legislative requirements, and reduce the quantity of surplus plutonium and the concomitant cost of secure storage.

Comment Summary: A number of comments were received on MOX fuel use. Commentors were concerned about public health and safety risks associated with MOX fuel processing; the suitability of reactors for using MOX fuel; and MOX fuel use in reactors that had previously been uranium-fueled. Commentors requested that DOE discuss the potential use of MFFF beyond the publicly stated mission of producing MOX fuel for light water reactors.

Response: MOX fuel use in commercial reactors is a demonstrated technology that has been used worldwide for over 40 years. The risks of preparing MOX fuel in MFFF are discussed in Appendix G, Section G.2. The risks of using MOX fuel in domestic commercial nuclear power reactors are discussed in Appendix I, Sections I.1.2 and I.2.2. As described in Appendix B, Section B.1.1.1.2, MOX fuel could be fabricated for commercial nuclear power reactors including boiling water reactors and pressurized water reactors. DOE has no plans to use MOX fuel in other than light water reactors.

Comment Summary: Commentors were concerned about the impact of adding a plutonium oxidation function to MFFF and that adding this function could delay startup of MFFF.

Response: Appendix B, Section B.1.1.2, describes the oxidation furnaces that could be added to MFFF. DOE anticipates that addition of the oxidation furnaces would not affect the startup date for MFFF; the impacts of installation and operation of the oxidation furnaces at MFFF are described in Appendix F.

Comment Summary: Commentors requested information on plutonium in MOX fuel, including how much plutonium would be in the fresh MOX fuel and how much plutonium would remain when the fuel is withdrawn from the reactors following irradiation.

Response: The footnote at the introduction to Chapter 2 provides a description of the amount of plutonium-239 in fresh MOX fuel and the reduction in plutonium-239 after irradiation in a nuclear power reactor. In addition, Appendix J, Section J.2.2, compares the radionuclide inventory in a full low-enriched uranium (LEU) core to that in a partial MOX fuel core.

Comment Summary: Commentors expressed concern about human health risks and increased risk of accidents using a partial MOX fuel nuclear reactor core instead of a full uranium fuel core. Commentors said that this *SPD Supplemental EIS* must analyze beyond-design-basis accidents, including accidents involving used fuel pools, and a "river tsunami accident" as a result of upstream dam failure at the TVA reactor sites. Commentors expressed concern that the accident at the Fukushima Daiichi Nuclear Power Station in Japan should be considered because the design of the reactors is similar to the design of the reactors at the Browns Ferry Nuclear Plant.

Response: Appendix I describes the potential impacts, including differences associated with the two types of nuclear reactor cores, and summarizes the results of the more detailed human health risk analysis presented in Appendix J. Appendix J, Section J.3.3, includes an analysis of beyond-design-basis accidents for the TVA reactors. Used fuel pool accidents are not typically evaluated in detail in reactor accident analysis because other accidents would have greater consequences. TVA has considered applicable natural phenomena, such as earthquakes, tornados, flooding, and dam failure, in Safety Analysis Reports prepared for each reactor (TVA 2009, 2010c). This *SPD Supplemental EIS* does not evaluate a dam failure "river tsunami accident," as this was not determined to be a credible accident in TVA's Safety Analysis Reports. Appendix J, Section J.3.3.3, describes the U.S. Nuclear Regulatory Commission (NRC) recommendations developed in response to the accident at the Fukushima Daiichi Nuclear Power Station in Japan and subsequent actions that TVA has taken to further reduce the likelihood and severity of accidents at its nuclear plants.

Comment Summary: Commentors requested that NRC's role in licensing the use of MOX fuel in commercial nuclear power reactors be explained.

Response: NRC regulations related to operation of domestic commercial nuclear power reactors are described in Chapter 5, Section 5.3.3, of this *SPD Supplemental EIS*. Domestic commercial nuclear power reactors undergo a rigorous licensing process under "Domestic Licensing of Production and Utilization Facilities" (10 CFR Part 50) or "Licenses, Certifications, and Approvals for Nuclear Power Plants" (10 CFR Part 52), beginning before facility construction and continuing throughout operation. Amendment to each reactor's operating license would be required prior to MOX fuel being brought to the reactor sites and loaded into the reactors. Public meetings are regularly held in conjunction with plant licensing, and opportunities would be available for public hearings before any license amendment is issued.

Comment Summary: Commentors expressed concern about the use of TVA's Sequoyah Nuclear Plant for the MOX fuel and tritium production missions.

Response: The interagency agreement with NNSA for tritium production requires TVA to use up to three of its pressurized water reactor units for tritium production. TVA decides how to use its pressurized water reactor units to meet DOE's needs. To date, TVA has been able to produce all tritium needed by NNSA in Watts Bar Unit 1. Steps are being taken to prepare Sequoyah Units 1 and 2 to be capable of tritium production, if needed. Currently, TVA does not anticipate the need to perform tritium producing burnable absorber rod irradiation at Sequoyah for at least several years, if ever. TVA would not produce tritium and irradiate MOX fuel during the same fuel cycle.

Comment Summary: Commentors requested that this *SPD Supplemental EIS* describe the impacts of used MOX fuel on used fuel management at a reactor. In addition, commentors asked that this *SPD Supplemental EIS* describe where the used MOX fuel and the can-in-canister assemblies containing immobilized plutonium would be disposed of and the thermal impacts of used MOX fuel on an interim storage facility or geologic repository.

Response: As described in Appendix I, Section I.1, each LEU and MOX fuel assembly would be discharged from the reactor with its own unique burn-up level and decay heat. The used fuel assemblies would be placed in the used fuel pool to reduce decay heat. When the decay heat reaches manageable levels, the used fuel assemblies would be moved to dry storage casks. By the time used fuel assemblies are ready for dry storage, the decay heat for the LEU and MOX fuel assemblies would be similar. DOE anticipates that MOX and LEU fuel assemblies would be managed similarly.

Comment Summary: Commentors expressed concern about lead assembly testing at the Catawba Nuclear Station and the need to conduct lead assembly testing in the TVA reactors. A commentor stated that NRC regulations require reactor testing to the burn-up level being sought for licensing. MOX lead assemblies were only tested for two cycles at the Catawba Nuclear Station.

Response: Significant worldwide experience with the use of MOX fuel, coupled with lead assembly testing programs, including the one at Duke Energy's Catawba Nuclear Station, indicates MOX fuel performance. MOX fuel lead assemblies were successfully tested in the Catawba Nuclear Station Unit 1 reactor. The four MOX fuel lead assemblies performed safely; no safety limits were exceeded. The need for future lead test assemblies based on the reactor's planned use of MOX fuel (burn-up levels) will be determined by NRC as part of the fuel qualification and licensing process.

Comment Summary: Concerns were raised about TVA, including the condition of reactors, public safety procedures, and TVA's ability to remain focused on its core mission.

Response: TVA's reactors are licensed by NRC to operate safely, and NRC would perform a comprehensive safety review before MOX fuel could be used. Ultimately, NRC would make any decisions related to future use of MOX fuel in TVA reactors as a result of this review process. TVA remains committed to its core mission and expects that MOX fuel could help fulfill this mission, as a safe and cost-effective fuel to generate electricity.

Comment Summary: Some commentors were concerned that DOE, rather than TVA, would make the decision to use MOX fuel at TVA's nuclear power reactors.

Response: The decision to use MOX fuel in the reactors at the Browns Ferry and/or Sequoyah Nuclear Plants would be made independently by TVA subject to license amendment by NRC.

Comment Summary: Commentors expressed concern about processing more plutonium through DWPF.

Response: As described in Appendix B, Section B.1.4.1, and analyzed in Appendix G, DOE has analyzed the potential environmental impacts of increasing the plutonium loading in DWPF canisters.

Comment Summary: Commentors were concerned that construction of a pit disassembly and conversion capability at SRS could result in another expensive, excess facility.

Response: As described in Section 1.4, DOE is revisiting its previous decision to construct a full-scale PDCF at SRS. See Chapter 2, Section 2.1, for a description of the pit disassembly and conversion options that DOE evaluates in this *SPD Supplemental EIS*.

Comment Summary: Commentors had numerous questions about the characteristics of existing facilities that would be used for plutonium disposition, including MFFF, H-Canyon/HB-Line, and DWPF at SRS; WIPP; and PF-4 at LANL.

Response: Appendix B describes the facilities that could be used for surplus plutonium disposition at SRS, LANL, and WIPP, including building and process line modifications and plutonium throughput. The environmental impacts and human health risks of construction and operation of these facilities are described in Appendices F (Impacts of Pit Disassembly and Conversion Options), G (Impacts of Plutonium Disposition Options), and H (Impacts of Principal Plutonium Support Facilities). The environmental impacts and human health risks of construction and operation of the alternatives are described in Chapter 4, including the potential impacts of accidents at DOE facilities in Section 4.1.2.2. Transportation impacts are described in Appendix E. Impacts from TRU waste disposal at WIPP are analyzed in the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE 1997b) and briefly described in Appendix A, Section A.2.

Comment Summary: Some commentors expressed concerns or requested that additional information be included in this *SPD Supplemental EIS* about consequences of potential accidents, security of nuclear materials, routine and accidental releases of radionuclides, worker safety, waste processing, synergistic effects of operating multiple facilities at SRS (i.e., cumulative impacts), dose calculation methods, transportation, the fate of waste vitrified at DWPF, and disposition of equipment after the surplus plutonium disposition activities are completed.

Response: Chapter 4 and supporting appendices of this *SPD Supplemental EIS* include analyses and discussions of these issues.

Comment Summary: Commentors were concerned about the risks of sabotage, theft, and terrorist attack on plutonium disposition facilities and transportation vehicles.

Response: The consequences of intentional destructive acts are described in Chapter 4, Section 4.1.2.5. This analysis is supported by a classified appendix to this *SPD Supplemental EIS* that is not available to the public.

Comment Summary: Commentors requested information on the environmental impacts and risks of expanded pit disassembly and conversion at PF-4 at LANL, including seismic and wildfire risks.

Response: Appendix F includes analyses of the environmental impacts and human health risks of expanded pit disassembly and conversion in PF-4, including the effects of handling larger quantities of plutonium in metal and oxide form. Appendix D, Section D.1.5.2.11, provides more-detailed information on accidents at PF-4, including consideration of natural phenomena hazards such as earthquakes, volcanoes, and wildfires. Section D.2.9.2 describes the completed and planned seismic upgrades to PF-4. To be conservative, the accident analyses in this *SPD Supplemental EIS* consider the current state of PF-4 without future seismic upgrades.

Comment Summary: A number of comments were received on the transportation of surplus plutonium, including risk of accidents, risk of transporting plutonium oxide powder, energy requirements, climate change impacts, and cumulative impacts.

Response: Chapter 4 addresses the issues raised. All shipments on public roads that contain plutonium pits or metal, or plutonium oxide powder would utilize NNSA's Secure Transportation Asset. All shipments would be in compliance with applicable U.S. Department of Transportation, NRC, and DOE requirements. Transportation impacts are described in Chapter 4, Section 4.1.5, and Appendix E. Cumulative transportation impacts and climate change impacts, including consideration of fuel used for transportation, are described in Chapter 4, Section 4.5. Notification of pending shipments would be given

to state and Federal agencies in accordance with existing regulations and agreements. For security reasons, notice would not be given to the public.

Comment Summary: A commentor suggested an alternative transportation route to WIPP.

Response: DOE is evaluating representative transportation routes for TRU waste to WIPP in this *SPD Supplemental EIS*, and will not be selecting specific shipping routes.

Comment Summary: Commentors expressed concern that surplus plutonium disposition activities may interfere with cleanup and remediation activities and other projects at the DOE sites.

Response: The alternatives analyzed in this *SPD Supplemental EIS* take into account the availability of facilities and their closure schedules. Information relevant to these issues is presented in the description of the alternatives in Chapter 2, Section 2.3. DOE expects there would be minimal disruption of cleanup and remediation activities at DOE sites.

Comment Summary: Commentors had concerns about environmental justice issues related to American Indian tribes near LANL. Commentors requested that community meetings be held in each pueblo and connecting river community within a 100-mile (161-kilometer) radius from LANL to honor the government-to-government consultation process. A commentor asked that DOE include American Indian tribal perspectives in this *SPD Supplemental EIS*.

Response: Chapter 3, Section 3.2.11, describes minority and low-income populations near LANL. Chapter 4, Section 4.1.6, analyzes environmental justice impacts of the alternatives for surplus plutonium disposition at LANL, including consideration of a tribal exposure or special pathways scenario and has concluded that American Indians living near LANL are not exposed to elevated risks compared to nonminority populations living in the same area, and that the risks associated with the activities proposed to be done at LANL are small. In support of its public outreach effort, DOE conducted three public scoping meetings in Carlsbad, Pojoaque (on the Pojoaque Reservation), and Santa Fe, New Mexico. DOE has a significant tribal outreach program with the tribes surrounding LANL and routinely meets with interested tribal governments to discuss issues of mutual concern. In support of this *SPD Supplemental EIS*, DOE will continue to hold discussions with American Indian groups and tribal governments to brief them on the scope of this *SPD Supplemental EIS*.

Comment Summary: Commentors requested specific details about monitoring and emergency response plans.

Response: Some of the details requested, such as what radionuclides or other elements could be released from normal operations and DOE facility accidents, are included in the radiological analyses in Chapter 4, Section 4.1.2, and Appendices C and D of this *SPD Supplemental EIS*. Information about SRS, LANL, and TVA emergency response plans appears in Chapter 3, Sections 3.1.6.5, 3.2.6.5, 3.3.1.2, and 3.3.2.2. Other information about monitoring may be found in other documents, such as the SRS, LANL, and WIPP annual environmental reports (accessible at http://www.srs.gov/ general/pubs/ERsum/ index.html, http://www.lanl.gov/environment/all/esr.shtml, and http://www.wipp.energy.gov/Documents_ Environmental.htm, respectively).

Comment Summary: Commentors were interested in the background and structure of DOE and its ability to execute whichever alternative is selected in the ROD.

Response: On August 4, 1977, President Carter signed the Department of Energy Organization Act, creating DOE from the Federal Energy Administration and the Energy Research and Development Administration. DOE's mission is to ensure America's security and prosperity by addressing its energy, environmental, and nuclear challenges through transformative science and technology solutions. NNSA

was established by Congress in 2000 as a separately organized, semiautonomous agency within DOE, responsible for the management and security of the Nation's nuclear weapons, nuclear nonproliferation, and naval reactor programs. DOE/NNSA has been working toward disposition of surplus plutonium for many years. As described in Appendix A, Section A.1, accomplishments to date include disposal of plutonium as TRU waste at WIPP; consolidation of surplus non-pit plutonium at SRS; and the ongoing construction of MFFF and the Waste Solidification Building. Surplus plutonium disposition activities are subject to the availability of funds appropriated by Congress.

Comment Summary: DOE received a number of comments on the public outreach effort. Commentors expressed dissatisfaction with notification for the public scoping meetings, numbers of scoping meeting, time allocated to comment, and scoping materials. A commentor requested that meetings be planned in collaboration with interested parties.

Response: DOE provided notice of public scoping meetings near potentially affected sites using a variety of media, including the *Federal Register*, the project website, press announcements, advertisements in local newspapers, and bulk mailings to persons on the project mailing list. DOE believes that the format of the scoping meetings and length of the public scoping period were adequate. DOE also believes that there was an appropriate number of scoping meetings, which were held in eight locations across the country. Commentors were also provided the opportunity to submit comments via mail, fax and email. Opportunities are available for individuals to be placed on the mailing list in order to receive updates and announcements related to this *SPD Supplemental EIS*. DOE has considered public comments in preparing the materials to be disseminated during the public hearings on this *Draft SPD Supplemental EIS*.

Comment Summary: A commentor requested that public hearings on this *Draft SPD Supplemental EIS* be held in Albuquerque and Santa Fe, New Mexico.

Response: DOE considered the request for meetings in Albuquerque and Santa Fe, New Mexico when planning for public hearings on this *Draft SPD Supplemental EIS*.

Comment Summary: Commentors expressed concern that the proposed use of MOX fuel is inconsistent with U.S. nonproliferation policy.

Response: The proposed use of MOX fuel is consistent with U.S. nonproliferation policy and international nonproliferation agreements. Use of MOX fuel would ensure that surplus plutonium is rendered into a used fuel form not readily usable for nuclear weapons.

A number of other issues raised by commentors are outside the scope of this *SPD Supplemental EIS*, including plutonium recycling, plutonium production, a nuclear-free world, war and nuclear weapons, mining sites that are contaminated and unsafe, the number of contractors with foreign roots involved in surplus plutonium disposition activities, concern that the surplus plutonium disposition program could be manipulated by special interests, the impacts of AREVA's operations in Europe, financial arrangements with utilities to use MOX fuel, TVA's interest in building new plants and its involvement in energy conservation and renewable energy, existing conditions at nuclear power reactors that are not a part of the proposed action, establishing a disposition path for the research reactor fuel in storage at SRS by processing through H-Canyon, compensation for local communities for extending plutonium storage at SRS, funding the complete cleanup of SRS, the presence of radioactive chemicals in the Rio Grande and Albuquerque drinking water, conduct of public meetings on the *CMRR-NF SEIS* (DOE 2011g), how the fate of waste vitrified at Hanford affects the proposed immobilization activities, support for other energy sources, emissions from coal-fired power plants, fluoride in toothpaste, and an invention to produce electricity.

1.7 Scope of this *Surplus Plutonium Disposition Supplemental Environmental Impact Statement*

In this *SPD Supplemental EIS*, DOE considers four action alternatives for the disposition of 13.1 metric tons (14.4 tons) of surplus plutonium and four options for pit disassembly and conversion of 34.6 metric tons (38.1 tons) (rounded to 35 metric tons [38.5 tons] in this *SPD Supplemental EIS*).[10] The alternatives involve DOE facilities at LANL, SRS, and WIPP. DOE also analyzes the potential environmental impacts of using MOX fuel in TVA's Browns Ferry and Sequoyah Nuclear Plants, as well as in one or more generic reactors. **Figure 1–8** shows the locations of major facilities that could be affected by activities analyzed in this *SPD Supplemental EIS*.[11]

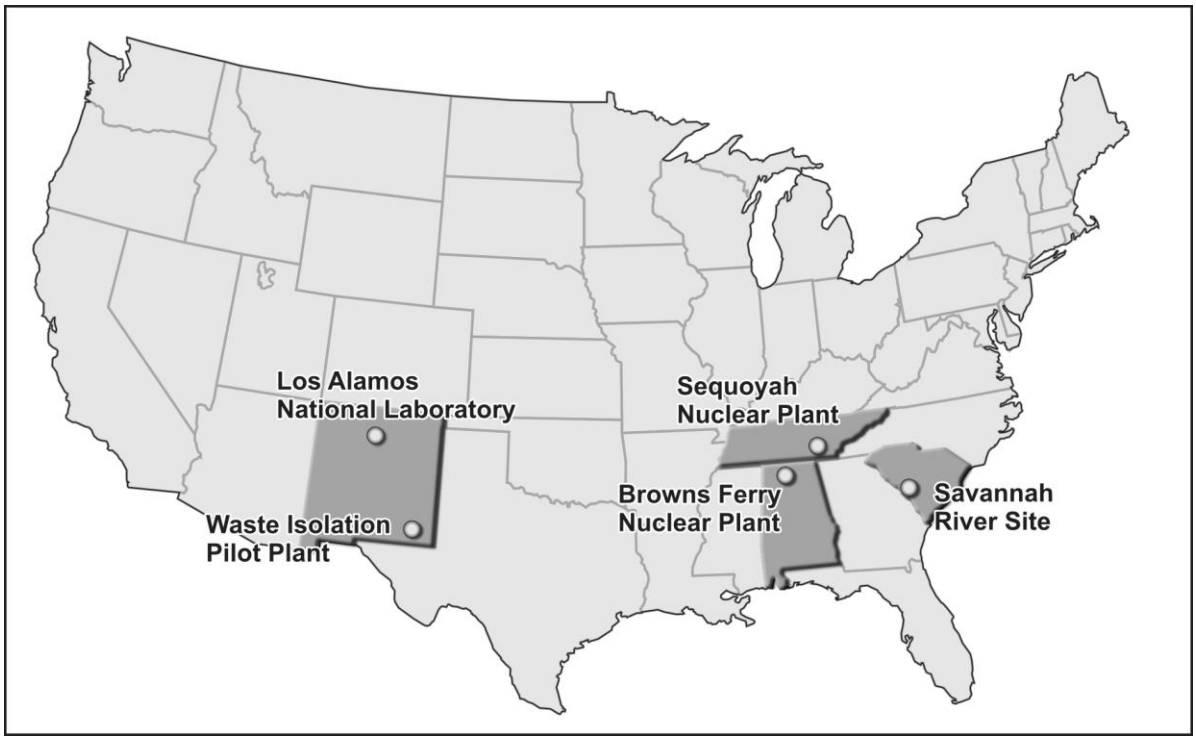

Figure 1–8 Locations of Major Facilities Evaluated in this *SPD Supplemental EIS*

Potential impacts from transporting surplus plutonium to WIPP are addressed in Chapter 4, Section 4.1.5, and Appendix E. The impacts from TRU waste disposed at WIPP are analyzed in the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE 1997b) and briefly described in Appendix A, Section A.2.

The 7.1 metric tons (7.7 tons) of surplus pit plutonium addressed in this *SPD Supplemental EIS* are currently stored at Pantex near Amarillo, Texas. The continued storage of these pits is analyzed in the *Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (DOE 1996b:3-1), which is incorporated by reference in this *SPD Supplemental EIS*. Potential impacts from transporting pits from Pantex to SRS and LANL are

[10] *As described earlier, in two RODs for the* SPD EIS *(65 FR 1608 and 68 FR 20134), DOE decided to fabricate 34 metric tons (37.5 tons) of surplus plutonium into MOX fuel at an MFFF being constructed at SRS. DOE is not revisiting those decisions. However, because DOE is revisiting its decision to construct and operate a PDCF at SRS, the pit disassembly and conversion options analyzed in this* SPD Supplemental EIS *will apply to the 27.5 metric tons (30.3 tons) of plutonium metal that DOE has decided to fabricate into MOX fuel, as well as the 7.1 metric tons (7.7 tons) of pit plutonium for which disposition is under consideration in this* SPD Supplemental EIS.

[11] *Because reactors that may use MOX fuel could be located anywhere in the United States, they are not shown on Figure 1–8.*

addressed in Chapter 4, Section 4.1.5, and Appendix E. The impacts from continued storage of pits at Pantex are briefly described in Appendix A, Section A.2.

This supplement to the *SPD EIS* incorporates Appendix F, "Impact Assessment Methodology," of the *SPD EIS* (DOE 1999b) by reference. Rather than repeat the details of this appendix, Chapter 4 of this *SPD Supplemental EIS* refers to Appendix F and describes only variations from the impact assessment methodology outlined in the *SPD EIS*.

1.8 Decisions to be Supported by this *Surplus Plutonium Disposition Supplemental Environmental Impact Statement*

DOE may issue a ROD announcing its decision no sooner than 30 days after publication in the *Federal Register* of the U.S. Environmental Protection Agency's Notice of Availability for the Final *SPD Supplemental EIS*. DOE could decide, based on programmatic, engineering, facility safety, cost, and schedule information, and on the environmental impact analysis in this *SPD Supplemental EIS*, which pit disassembly and conversion option to implement and which option to implement for disposition of the additional 13.1 metric tons (14.4 tons) of surplus plutonium.

As stated in the 2010 amended NOI (75 FR 41850) and reaffirmed in the 2012 amended NOI (77 FR 1920), DOE and TVA are evaluating use of MOX fuel in up to five TVA reactors at the Sequoyah and Browns Ferry Nuclear Plants. TVA would determine whether to pursue irradiation of MOX fuel in TVA reactors and which reactors to use for this purpose.