CHAPTER 1

INTRODUCTION AND STATEMENT OF PURPOSE AND NEED

The U.S. Department of Energy (DOE) is proposing to construct and operate an Actinide Chemistry and Repository Science Laboratory (ACRSL) to support chemical research activities related to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. The laboratory would be located on New Mexico State University property adjacent to the existing Carlsbad Environmental Monitoring and Research Center (CEMRC) in Carlsbad, New Mexico. Figure 1-1 shows the locations of the CEMRC and WIPP sites and the community of Los Alamos within the state of New Mexico. DOE has prepared this environmental assessment (EA) to assess the potential environmental impacts associated with the proposed laboratory and reasonable alternatives. The EA was prepared pursuant to the National Environmental Policy Act (NEPA) of 1969, 42 USC 4321 *et seq.*, and DOE NEPA-implementing regulations, Title 10 of the Code of Federal Regulations (CFR) Part 1021.

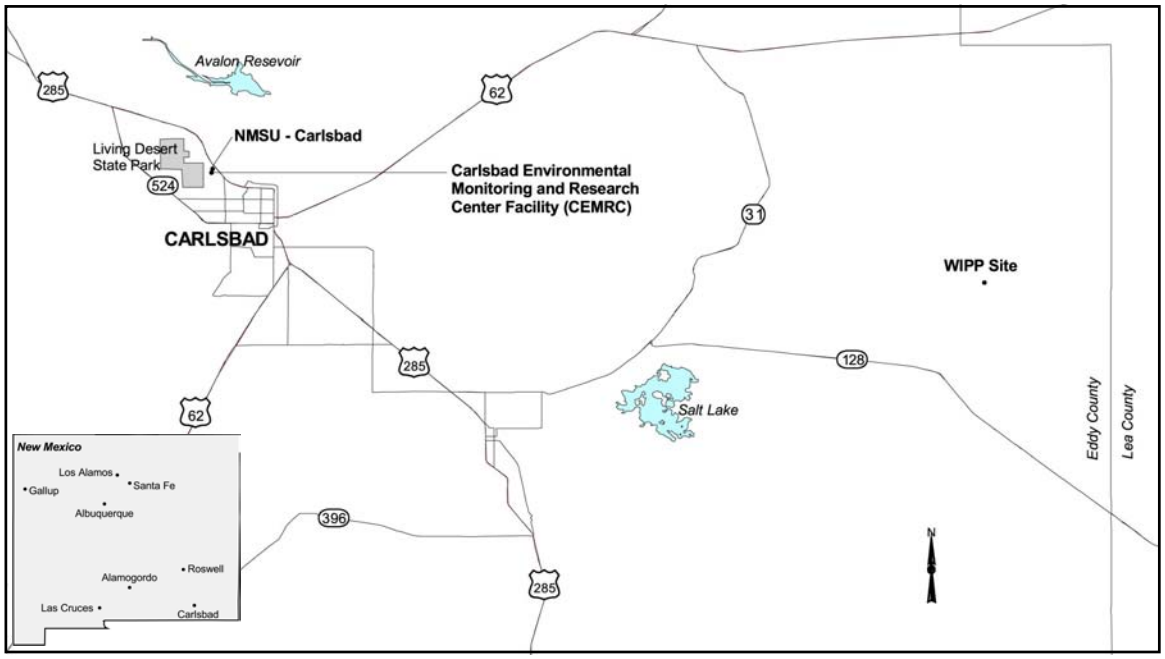

Figure 1-1. Locations of the CEMRC, the WIPP Site, and Los Alamos

1.1 PURPOSE AND NEED FOR AGENCY ACTION

WIPP is the only facility licensed to dispose of transuranic (TRU) waste generated by DOE defense activities. The mission of WIPP is to isolate and dispose of defense TRU waste in a manner that protects public health and the environment. In March 1999, WIPP received its first shipment of TRU waste, and the 500th shipment arrived in January 2002.

TRANSURANIC (TRU) WASTE

TRU waste is defined as "waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes, per gram of waste, with half-lives greater than 20 years, except for (A) high-level radioactive waste; (B) waste that the Secretary [of Energy] has determined, with concurrence of the Administrator [of the Environmental Protection Agency], does not need the degree of isolation required by the disposal regulations; or (C) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with part 61 of Title 10, Code of Federal Regulations" (WIPP Land Withdrawal Act, Public Law 102-579). All TRU elements are heavier than uranium, have several isotopes, and are typically man-made. Key radionuclides found in TRU waste include americium-241 and several isotopes of plutonium (plutonium-238, plutonium-239, plutonium-240, and plutonium-241). The half-lives of many are considerably longer than 20 years. For instance, the half-life of one isotope of plutonium is 24,000 years.

TRU waste is further classified as contact-handled (CH)-TRU waste or remote-handled (RH)-TRU waste. CH-TRU waste has radioactivity levels that are low enough to permit workers to directly handle the containers in which the waste is kept. This level of radioactivity is specified as a dose rate of no more than 200 millirem (mrem) per hour at the outside surface of the container. RH-TRU waste has a surface dose rate greater than 200 mrem per hour, so workers use remote manipulators to handle containers of RH-TRU waste. TRU mixed waste is CH-TRU or RH-TRU waste that also contains hazardous materials such as lead or organic solvents that are regulated by the Resource Conservation and Recovery Act.

To ensure the continued safe handling and management of TRU waste, DOE needs to address specific scientific and technical issues related to waste characterization, repository performance, and enhanced operations of the repository. In addition, DOE is required to demonstrate compliance with standards for disposal of TRU waste in accordance with criteria codified in 40 CFR Part 194. The U.S. Environmental Protection Agency (EPA) certified DOE's compliance with the disposal standards in 1998; in order to continue to receive shipments of TRU waste, EPA must recertify DOE in 2004 and every 5 years thereafter. Information to be provided to EPA for the upcoming and future recertification processes will likely require data from focused radiological and non-radiological chemistry experiments. Planned and potential experiments to support WIPP operations and recertification could include: the effects of WIPP-relevant materials (such as reductants) and potential radiolysis by-products (for example, hypochlorite and peroxide) on the oxidation states and speciation of plutonium, americium, uranium, thorium, and neptunium; the effects of organic ligands on the mobility of plutonium and other actinide elements in WIPP-relevant brines; the demobilization of actinides by borehole fill materials; and the efficacy of oxidation state analogs for predicting the behavior of the actinides (Mercer 2002). Appendix A contains additional information on potential laboratory experiments.

In the past, WIPP-related chemical research activities have been performed at several different laboratories located around the country. For example, a variety of radiochemistry experiments have been conducted at Los Alamos National Laboratory (LANL), actinide oxidation/reduction experiments were conducted at Argonne National Laboratory, actinide complexing experiments were conducted at Florida State University, and plutonium solubility experiments were performed at the Pacific Northwest National Laboratory. Now, with the exception of the LANL location, WIPP has ended experiments at other sites. DOE has determined that it would be much more efficient and cost-effective to consolidate these activities in a local Carlsbad facility

ACTINIDES

The actinides are the 15 chemical elements with atomic numbers 89 to 103, inclusively. The group consists of actinium, thorium, protactinium, uranium, neptunium, plutonium, americium, curium, berkelium, californium, einsteinium, fermium, mendelevium, nobelium, and lawrencium. Eleven of the fifteen actinides (neptunium through lawrencium) are transuranic and therefore meet the quantitative definition of TRU waste contaminants. Because all of the actinides share certain physical and chemical characteristics, research on the fate, effects, and mobility of these elements provides data that are applicable to an understanding of the fate, effect, and mobility of the TRU waste that has been and will be disposed of at WIPP.

that does not present the difficulties inherent with the distances currently involved or the security requirements at laboratories that primarily perform weapons-related work. To address both near- and long-term scientific issues related to WIPP performance, DOE has identified a need to enhance and consolidate the repository's experimental program at one facility. Such a program would also facilitate support for WIPP's international programs by providing a central location for conducting actinide chemistry experiments of interest to waste disposal programs in other countries.

Development of this program will require a highly credible environmental assay and actinide chemistry laboratory that is capable of supporting work with very low to high levels of radioactive materials. Currently, no such facility exists in Carlsbad. DOE proposes to design, construct, and operate a multi-user laboratory (the ACRSL) adjacent to the existing CEMRC facility in Carlsbad (hereafter referred to as the Proposed Action in this EA). This laboratory could be (1) an existing mobile laboratory that was constructed with DOE Office of Science and Technology (EM-50) funds, has been relocated to Carlsbad, and is functional, but is not equipped for experiments at the levels of radioactivity desired for the ACRSL; (2) a newly constructed facility; or (3) a combination of the existing mobile facility and a new facility. Locating the laboratory next to the CEMRC would leverage the existing CEMRC infrastructure and licenses at a significant savings in time and cost.

Alternatives to the Proposed Action include the No Action Alternative (continuing to conduct actinide chemistry experiments at existing LANL laboratories) and the WIPP Alternative (locating the new laboratory at the WIPP site). DOE also considered but did not analyze other alternatives because they were not reasonable given technical and cost considerations. The Proposed Action and alternatives are described in Chapter 2.

1.2 BACKGROUND

DOE is responsible for the management and ultimate disposition of TRU waste generated at DOE sites by defense operations. Pursuant to this responsibility and as directed by Congress, DOE constructed and operates WIPP as a permanent geological repository for the disposal of TRU waste. WIPP is located at a depth of 655 meters (2,150 feet) in Eddy County in southeastern New Mexico, about 50 kilometers (30 miles) east of Carlsbad. Congress authorized WIPP at its current location in 1979, and the Construction and Salt Handling Shaft was drilled in 1981. In 1984, DOE and the State of New Mexico agreed that WIPP must comply with all state, federal, and local laws and regulations, including those imposed by EPA. Facility construction and initial mine excavation phases were completed in 1988. In 1992, Congress passed the WIPP Land Withdrawal Act, which withdrew 41 square kilometers (10,240 acres) of federal land from public use for exclusive WIPP use. In 1993, EPA issued compliance standards for WIPP certification and recertification (see 40 CFR 191) and, in 1996, issued criteria to certify and determine WIPP's compliance with these standards (see 40 CFR Part 194). In 1998, the Agency certified that WIPP had met all applicable federal nuclear waste disposal standards. In 1999, the State of New Mexico issued a Hazardous Waste Facility Permit that allowed WIPP to receive and dispose of mixed waste.

The CEMRC, a division of the College of Engineering at New Mexico State University, was established in 1991 through a grant from DOE to the University. The goals of the CEMRC are to (1) establish a permanent center of excellence to anticipate and respond to emerging health and environmental needs, and (2) function as a nucleus of research excellence supported through grant funding and service contracts. Figures 1-1 and 1-2 show the location of the Center and an aerial view of it, respectively; the aerial view also depicts a simulated extension of the existing building to show where the proposed laboratory would be located.

The CEMRC was funded initially for a 7-year period (1991–1998), and the grant was subsequently extended to 2008. Funding for the CEMRC included approximately $7 million for construction of a 2,415-square-meter (26,000-square-foot) facility to house low-level radiochemistry and environmental science laboratories, an *in vivo* bioassay facility, computing operations, and offices. Construction of this facility was completed in December 1996.

Figure 1-2. Aerial View of the CEMRC and Proposed ACRSL Facility

The primary focus of the CEMRC radiochemistry program is the measurement of radioactive substances in various media at environmental background levels. To achieve this task, the CEMRC was designed as a low-level radiation facility. The media of interest include, but are not limited to, aerosols, soil, surface water and sediment, ground- and drinking water, and biota and biological materials. The radioanalytical group performs low-level measurement of actinides, fission products, activated corrosion products, and naturally occurring radionuclides. Approximately 158 square meters (1,700 square feet) of space are allocated to the radioanalytical program, including a primary radioanalytical laboratory and separate tracer and counting laboratories. The instrumentation laboratory is equipped for the low-level measurement of actinides, fission products, activated corrosion products, and naturally occurring radionuclides. The current inventories of chemicals and radiological materials at the CEMRC are provided in Appendix B.

1.3 LICENSING AND REGULATORY REQUIREMENTS

The current CEMRC research program involves the use of radioactive materials. Pursuant to the New Mexico Radiation Protection Act of 1978 and the Radiation Protection Regulations Subpart 3, the CEMRC applied for, received, and maintains a Type A Specific License of Broad Scope for radioactive materials. This license allows for the laboratory use and possession of by-product, source, and special nuclear materials at the CEMRC. The current CEMRC license, as amended, would allow the quantities of radioactive materials required for the scientific activities to be conducted in the proposed actinide laboratory. As the owner and manager of the proposed new facility, the CEMRC would comply with regulations governing the management and disposal of hazardous, low-level radioactive wastes by shipping such wastes off site in accordance with the existing generator regulations that govern waste

management at the CEMRC. The CEMRC has appointed a hazardous and radiological waste coordinator to ensure operations are conducted safely in accordance with New Mexico Environment Department requirements. Current levels of hazardous and radioactive wastes generated at the CEMRC would double with the addition of the proposed ACRSL. However, the new quantity and types of wastes would be well within the capabilities of commercial disposal companies already used at the CEMRC.

1.4 NATIONAL ENVIRONMENTAL POLICY ACT PROCESS

1.4.1 Previous WIPP NEPA Compliance Activities

In 1980, DOE prepared the *Final Environmental Impact Statement for the Waste Isolation Pilot Plant* (FEIS) (DOE 1980) to assess the potential environmental effects of developing WIPP and of alternatives for disposing of or managing TRU waste. The FEIS proposed a two-phased approach to the development of WIPP: (1) a site and preliminary design validation program, and (2) full construction. This approach was adopted in a Record of Decision (ROD) issued in 1981 (46 Fed. Reg. 9162 [1981]).

After construction of most of the WIPP facilities, DOE prepared the *Final Supplement Environmental Impact Statement for the Waste Isolation Pilot Plant* (SEIS-I) (DOE 1990) to update the environmental record established in the FEIS. The SEIS-I ROD, published by DOE in 1990, chose to continue the phased approach to developing WIPP by beginning an underground test phase (55 Fed. Reg. 25689 [1990]). The SEIS-I ROD also committed the Department to prepare a second supplement disposal phase environmental impact statement (EIS).

The *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (SEIS-II) was issued in September 1997. The SEIS-II ROD was issued on January 16, 1998 (63 Fed. Reg. 3623 [1998]). In that document, DOE announced its decision to dispose of TRU waste generated by defense activities at WIPP (DOE 1997).

DOE has also prepared two other EAs for activities related to TRU waste disposal. The *Environmental Assessment of the Carlsbad Environmental Monitoring and Research Center Facility* (DOE 1995c) was prepared to determine if continued DOE funding of the CEMRC, or alternative actions, would have significant environmental impacts. A finding of no significant impact was issued in October 1995. DOE also prepared the *Environmental Assessment for the Construction and Operation of the Sand Dunes to Ochoa Powerline Project* (DOE 1995b).

1.4.2 Stakeholder Outreach and Involvement Activities

NEPA requires that federal, state, and local agencies with jurisdiction or special expertise regarding environmental impacts be consulted and involved in the NEPA process. Agencies involved include those with the authority to issue permits, licenses, and other regulatory approvals. Other agencies include those responsible for protecting significant resources such as endangered species or wetlands. A list of persons and agencies consulted is provided in Chapter 5.

The draft version of this EA was prepared in March 2002 and distributed for public comment. During the public comment period (March 22 to April 22), DOE held a public meeting in Carlsbad, New Mexico, to provide information regarding the Proposed Action and to solicit public comments. Appendix C contains a record of the public's comments and DOE's responses. Following issuance of the final EA, DOE will determine whether to issue a finding of no significant impact or to proceed with the preparation of an EIS.

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