1 GENERAL DESCRIPTION

1.1 Conduct of Review

On November 19, 2001, Foster Wheeler Environmental Corporation (FWENC)submitted a license application (Foster Wheeler Environmental Corporation, 2001a) in accordance with 10 CFR Part 72 to the U.S. Nuclear Regulatory Commission (NRC) to construct and operate the proposed Idaho Spent Fuel (ISF) Facility, an independent spent fuel storage installation (ISFSI). Included in the FWENC license application is the Safety Analysis Report (SAR) (Foster Wheeler Environmental Corporation, 2001b). Amendment 1 of the SAR (Foster Wheeler Environmental Corporation, 2002), which was submitted in November 2002, incorporates certain information associated with the transfer casks to be supplied by the U. S. Department of Energy (DOE). Amendment 2 of the SAR (Foster Wheeler Environmental Corporation, 2003a), which was submitted in March 2003, incorporates responses to the NRC staff's request for additional information (Foster Wheeler Environmental Corporation, 2003b). Amendment 3 of the SAR (Foster Wheeler Environmental Corporation, 2003c), which was submitted in November 2003, incorporates responses to the second round of requests for additional information (Foster Wheeler Environmental Corporation, 2003d). The NRC staff's review as documented in this Safety Evaluation Report (SER) is based on the information provided through Amendment 3 of the ISF Facility SAR. The staff's review of the SAR was conducted following the guidance provided in NUREG–1567 (U.S. Nuclear Regulatory Commission, 2000) and, as appropriate, NUREG–1536 (U.S. Nuclear Regulatory Commission, 1997).

Chapter 1 of the SAR for the proposed ISF Facility explains the need for the facility and provides a general description of the site, the major components and operations of the ISF Facility, and a brief description of Idaho National Engineering and Environmental Laboratory (INEEL) facility areas. Chapter 1 of Appendix A of the SAR provides a general, nonproprietary description of the transfer cask components and operations from loading the transfer casks through transportation to placement of the loaded transfer cask into the ISF Facility cask trolley. This chapter of the SAR familiarizes the reader with the pertinent features of the installation and the transfer casks.

The staff reviewed the applicant's general description in the SAR to determine if the following regulatory requirements have been met:

- 10 CFR §72.22 requires general and financial information.

- 10 CFR §72.24(b) requires a description and discussion of the ISFSI structures with special attention to design and operating characteristics, unusual or novel design features, and principal safety considerations.

- 10 CFR §72.24(f) requires a description of the features of ISFSI design and operating modes to reduce to the extent practicable radioactive waste volumes generated at the installation.

- 10 CFR §72.24(l) requires a description of the equipment to be installed to maintain control over radioactive materials in gaseous and liquid effluents produced during

normal operations and expected operational occurrences. The description must identify the design objectives and the means to be used for keeping levels of radioactive material in effluents to the environment as low as reasonable achievable and within the exposure limits stated in §72.104.

1.1.1 Introduction

The proposed ISF Facility at INEEL will provide interim dry storage for spent nuclear fuel (SNF) from the Peach Bottom and Shippingport reactors and from Training, Research, and Isotope reactors built by General Atomics (TRIGA) until the SNF can be removed from the State of Idaho. These fuels are included in the Settlement Agreement dated October 17, 1995, between the State of Idaho, the U.S. Department of the Navy, and the U.S. Department of Energy (U.S. Department of Energy, 1995). This ISF Facility will be an ISFSI that will use dry storage technology. In accordance with 10 CFR §72.42, an ISFSI will be licensed initially for 20 years. Before the end of this license term, the applicant may elect to submit an application to renew the license. According to the terms of the 1995 Settlement Agreement, all SNF will be transferred offsite after a permanent repository is operational, but prior to 2035. The facility then will be decommissioned in accordance with the license termination rule (10 CFR Part 20, Subpart E).

The ISF Facility will be located within the 2,305 km^2 [890 mi^2] INEEL site. The INEEL is a U.S. Department of Energy-controlled site in southeast Idaho, consisting of eight primary facility areas. Buildings and other structures are clustered within these primary facility areas, which are typically less than a few square miles in size and separated from each other by miles of mostly undeveloped land. The ISF Facility site will occupy approximately 3.2 ha [8 acres] of land adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC). INTEC is a U.S Department of Energy (DOE) facility with the mission to receive and store SNF and radioactive waste. INTEC occupies approximately 48.6 ha [120 acres] of the south-central portion of the INEEL and is approximately 67.6 km [42 mi] west of Idaho Falls. The DOE operates a separate NRC-licensed ISFSI within the INTEC for the storage of Three Mile Island Unit 2 (TMI-2) damaged SNF.

Approximately 22.2 metric tons [24.5 tons] of heavy metal SNF will be stored at the ISF Facility. Shippingport SNF comprises approximately 85.3 percent by weight of this total amount of heavy metal. Peach Bottom and TRIGA SNF make up approximately 13.3 and 1.4 percent by weight of the material to be stored. Because of the lengthy cooling period of Shippingport and Peach Bottom SNF, these fuels will produce relatively low decay heat compared with typical commercial SNF. Although the age of the TRIGA SNF varies, it also will generate low decay heat, because of the design and operational characteristics of the TRIGA research reactors. The SNF will be transferred to the ISF Facility by the U.S. Department of Energy–Idaho Operations Office (DOE-ID) using two existing Peach Bottom casks (PB-1 and PB-2)

The ISF Facility will provide for receipt and repackaging of the SNF into sealed storage canisters that will be licensed by the NRC as a part of licensing the ISF Facility. These storage canisters will provide the primary confinement boundary for the SNF, and they are intended to be compatible with the DOE repository waste package suitable for disposal at a permanent repository. Thus, these canisters will facilitate transfer of the SNF to a repository for permanent disposal without the need for further direct handling or repackaging.

The loaded and sealed canisters will be stored in individual storage tubes that will have a bolted lid with double metallic seals rings. The storage tubes will provide a redundant confinement boundary for the SNF. The storage building will provide radiological shielding and passive natural convection air cooling. The SNF will be transported from its existing locations in the INEEL to the ISF Facility according to INEEL procedures and DOE orders. The movement and transfer of SNF within the ISF Facility site will be conducted according to the provisions of 10 CFR Part 72.

1.1.2 General Description of Idaho Spent Fuel Facility Installation

The location of the ISF Facility will be within the 2,305-km^2 [890-mi^2] INEEL site in southeast Idaho. The ISF Facility site will occupy approximately 3.2 ha [8 acres] adjacent to INTEC in south-central INEEL. The INTEC is approximately 67.6 km [42 mi] west of Idaho Falls.

The ISF Facility will be designed to store SNF from the Peach Bottom Unit 1, Shippingport, and TRIGA reactors in metal canisters. The SNF elements or rods will be placed in sealed canisters, which will then be placed inside tubes that have a bolted lid with double metallic seal rings.

The ISF Facility will be a fully enclosed building complex that will allow operations to receive, repackage, and store SNF. The ISF Facility will consist of three principal areas: cask receipt area (CRA), transfer area, and storage area. A common Transfer Tunnel will allow movement of SNF throughout the facility using rail-mounted trolleys. The ISF Facility will be passive and will not rely on active cooling systems.

In the CRA, the incoming transfer casks will be transferred from truck-mounted transporters to a rail-mounted cask trolley for subsequent movement into other areas of the ISF Facility. The transfer area will be used to unload the SNF from the transfer cask and repackage it into the storage canisters. The stainless steel canisters will be vacuum dried, backfilled with helium, and welded closed to provide an inert storage atmosphere for the SNF. The storage area will provide interim dry storage of the SNF. The storage area will consist of a passively cooled concrete vault housing 246 metal storage tubes.

The staff finds that the site and ISF Facility descriptions have sufficient detail to allow familiarization with the characteristics of the proposed ISF Facility.

1.1.3 General Systems Description

The ISF Facility will consist of two classes of systems; fuel handling systems and auxiliary systems. The fuel handling systems will include the Transfer Tunnel and trolleys, CRA, transfer area, and storage area. The auxiliary systems will include heating, ventilation, and air conditioning systems; power distribution system; radiation monitoring system; closed-circuit television (CCTV) monitoring system; integrated data collection system; radioactive waste processing systems; solid waste processing system; liquid waste processing system; fire protection system; potable water supply system; sanitary waste water system; compressed air system; and breathing air system.

The Transfer Tunnel will provide connections between the CRA, transfer area, and the storage area of the ISF Facility. The CRA will be designed to receive the SNF shipments; transfer the loaded incoming transfer cask from the transport vehicle to the cask trolley using a single-failure-proof, fixed-hoist crane; and move the trolley carrying the loaded transfer cask to the transfer area. In the transfer area, the SNF will be unloaded, and the trolley carrying the empty transfer cask will move back through the Transfer Tunnel to the CRA to prepare for the return of the empty transfer cask to DOE for further use.

In the ISF Facility, the transfer area will accommodate unloading the SNF from the incoming transfer cask and repackaging it into stainless steel canisters. Each canister will be vacuum dried, backfilled with helium, and welded closed to provide an inert storage atmosphere for the SNF. The SNF will be handled entirely by remote manipulation within the fuel packaging area (FPA), which will be a subarea of the transfer area. A specially designed fuel handling machine (FHM) will be used for remote manipulation of the SNF. The FHM will include a single-failure-proof bridge crane and hoist with multiple, interchangeable lifting fixtures designed for each SNF type, and a power manipulator system (PMS). The FHM hoist will be used to lift and move the SNF. Master/slave manipulators and the PMS will be used to perform any required remote manual operations. The FPA will include windows and a CCTV system to aid operator viewing from the operating gallery outside the FPA. The transfer area also will include a solid waste processing area, where solid radioactive waste will be prepared for shipping to the INEEL Radioactive Waste Management Complex.

The storage area will provide interim dry storage of the SNF inside sealed canisters inserted into the storage tubes. This area will consist of a passively cooled concrete vault housing 246 metal storage tubes inside an enclosed, metal-sided building that will provide weather protection. Each storage tube will provide interim storage for a single ISF canister. A canister handling machine (CHM) will be used to move individual canisters from the transfer tunnel to their storage tube location and to insert the canisters into the storage tubes. The CHM will consist of a single-failure-proof bridge crane with an integral shielded transfer cask. After placement of a canister inside a storage tube and installation of a shield plug, the storage tube will be sealed with a cover plate with dual metallic seal o-rings to provide redundant, outer confinement barrier during storage. Storage tubes will be filled with an inert atmosphere to reduce potential corrosion of the canisters during storage.

The NRC staff finds that the description of the storage cask system to be used at the ISF Facility is sufficiently detailed to allow familiarization with its design.

1.1.4 General Transfer Cask Systems Description

The DOE-ID is responsible for transporting the SNF from the current storage facilities at the INEEL site to the ISF Facility. All SNF will be transferred to the ISF Facility using two existing Peach Bottom casks (PB-1 and PB-2). These transportation casks were previously licensed by the U.S. Atomic Energy Commission (AEC) in September 1974 in accordance with the provisions of 10 CFR Part 71 (U.S. Atomic Energy Commission, 1974). The AEC issued Certificate of Compliance (CoC) No. 6375 for both casks. This CoC authorized the use of the casks for shipment of Peach Bottom Core 1 fuel elements, Enrico Fermi Blanket Fuel Subassemblies, and solid reactor components. By letter, dated February 1, 1982, Chem-Nuclear Systems, Inc. informed the NRC of its intentions to remove the Peach Bottom-1

cask from service by March 22, 1982, and allowed CoC No. 6375 to expire. In order to demonstrate that both casks are acceptable for the on-site transfer of the designated SNF to the ISF Facility, DOE-ID evaluated the design and performance of both casks, and that evaluation was provided to FWENC and included as Appendix A to the ISF Facility SAR.

Both transfer casks along with all handling and transport equipment are supplied, operated, and maintained by DOE-ID and their support contractor. The SNF will be loaded by DOE-ID into the transfer casks at one of several existing INTEC fuel storage facilities and will be transported to the ISF Facility.

1.1.5 Identification of Agents and Contractors

Section 1.4 of the SAR identifies the organizations responsible for providing the licensed SNF storage and transfer systems and engineering, design, licensing, and operation of the ISFSI. Foster Wheeler Environmental Corporation has the overall responsibility for design, licensing, construction, and operation of the ISF Facility. The U.S. Department of Energy, however, will retain title to the SNF and will be responsible for the ultimate decommissioning of the ISF Facility. RWE NUKEM, Ltd. will provide support to the applicant for design of the transfer area. Design support for the storage area will be provided by ALSTEC Ltd. Utility Engineering will support the Foster Wheeler Environmental Corporation for facility operations and general architectural design.

The transfer cask systems are government-furnished property and are maintained by the DOE-ID and its support contractor. The support contractor also is responsible for loading the casks with SNF, transferring the casks to the ISF Facility, and returning the unloaded casks to the INTEC.

The staff finds that agents and contractors responsible for the design and operation of the installation have been adequately identified.

1.1.6 Material Incorporated by Reference

Many chapters of the SAR include a reference section that identifies documents referred to in those chapters.

The staff finds that material incorporated by reference, including topical reports and docketed material, has been appropriately identified in the SAR.

1.2 Evaluation Findings

The staff finds that the site and ISF Facility descriptions presented in Chapter 1 of the SAR have sufficient detail to allow familiarization with the pertinent site- and facility-related features of the proposed ISF Facility and are in compliance with 10 CFR §72.22, §72.24(b), (f), and (l). The staff finds that the descriptions presented in Appendix A of the SAR and the supporting documents have sufficient detail to allow familiarization with the transfer casks.

1.3 References

Foster Wheeler Environmental Corporation. *Safety Analysis Report, Idaho Spent Fuel Facility.* Amendment 2. Docket No. 72-25. ISF–FW–RPT–0033. Rev. 2. Morris Plains, NJ: Foster Wheeler Environmental Corporation. March 2003a.

Foster Wheeler Environmental Corporation. *Response to Request for Additional Information*. Idaho Spent Fuel Facility License Application. FW–NRC–ISF–03–0010. Richland, WA: Foster Wheeler Environmental Corporation, Idaho Spent Fuel Facility Project. January 22, 2003b.

Foster Wheeler Environmental Corporation. *Safety Analysis Report, Idaho Spent Fuel Facility*. Amendment 3. Docket No. 72-25. ISF–FW–RPT–0033. Rev. 3. Morris Plains, NJ: Foster Wheeler Environmental Corporation. November 2003c.

Foster Wheeler Environmental Corporation. *Response to NRC Second Round Request for Additional Information*. Idaho Spent Fuel Facility License Application. FW–NRC–ISF–03–0198. Richland, WA: Foster Wheeler Environmental Corporation, Idaho Spent Fuel Facility Project. August 28, 2003d.

Foster Wheeler Environmental Corporation. *Safety Analysis Report, Idaho Spent Fuel Facility.* Amendment 1. Docket No. 72-25. ISF–FW–RPT–0033. Rev. 1. Morris Plains, NJ: Foster Wheeler Environmental Corporation. November 2002.

Foster Wheeler Environmental Corporation. *License Application, Idaho Spent Fuel Facility.* Docket No. 72-25. ISF–FW–RPT–0127. Rev. 0. Morris Plains, NJ: Foster Wheeler Environmental Corporation. November 2001a.

Foster Wheeler Environmental Corporation. *Safety Analysis Report, Idaho Spent Fuel Facility*. Docket No. 72-25. ISF–FW–RPT–0033. Rev. 0. Morris Plains, NJ: Foster Wheeler Environmental Corporation. November 2001b.

U.S. Atomic Energy Commission. *Certificate of Compliance, Peach Bottom 1 Cask*. CoC USA/6375/B()F. Docket No. 71-6375. Washington, DC: U.S. Atomic Energy Commission. September 1974.

U.S. Department of Energy. *Settlement Agreement Between the State of Idaho, Department of the Navy, and the Department of Energy*. Washington, DC: U.S. Department of Energy. 1995.

U.S. Nuclear Regulatory Commission. *Standard Review Plan for Spent Fuel Dry Storage Facilities.* NUREG–1567. Washington, DC: U.S. Nuclear Regulatory Commission. 2000.

U.S. Nuclear Regulatory Commission. NUREG–1536, *Standard Review Plan for Dry Storage Systems.* Washington, DC: U.S. Nuclear Regulatory Commission. 1997.

U.S. Nuclear Regulatory Commission. *Request for Additional Information for the Idaho Spent Fuel Facility Application*. Letter (October 25) from J.R. Hall to R.D. Izatt, Foster Wheeler Environmental Corporation. Washington, DC: U.S. Nuclear Regulatory Commission. 2002.

U.S. Nuclear Regulatory Commission. *Second Round Request for Additional Information for the Idaho Spent Fuel Facility Application*. Letter (June 4) from J.R. Hall to R.D. Izatt, Foster Wheeler Environmental Corporation. Washington, DC: U.S. Nuclear Regulatory Commission. 2003.