3 OPERATION SYSTEMS

3.1 Conduct of Review

The objective of the operations system review is to determine if the operations presented in the SAR are clear and comprehensive and fulfill the NRC regulatory requirements. The review of the operation systems included Chapter 5, Operation Systems, and selected sections of Chapters 1, 3, 4, 6, 8, 9, and 10 of the SAR, and documents cited in the SAR.

3.1.1 Operation Description

The description of the operating system was reviewed for conformance with the following regulations:

- 10 CFR 72.40(a)(5) and (13) require that the proposed activities can be conducted without endangering the health and safety of the public.
- 10 CFR 72.104(b) requires that the as low as reasonably achievable (ALARA) principle is considered in the design.
- 10 CFR 72.122(i) requires that the operation descriptions provide acceptable descriptions and discussions of the projected operating characteristics and safety considerations.
- 10 CFR 72.126(b–c) require that the design consider radiological alarm systems and direct radiation monitoring.
- 10 CFR 72.128(a)(1) requires that the design and procedures provide acceptable capability to test and monitor components important to safety.

In SAR Chapter 5, the applicant describes the generic operations to be performed in preparing the HI-STORM 100 Cask System for storage and during actual storage. The operations to be performed at the site include receipt and inspection of incoming shipping casks with canisters containing the spent fuel, transfer of the canisters containing the spent fuel from the shipping casks to the storage casks via the transfer cask, placement of the storage casks on the storage pads, surveillance of the storage casks, security of the Facility, maintenance of the health physics conditions consistent with ALARA requirements and site technical specifications, maintenance of the site and storage casks, removal of spent fuel canisters from the site, and inventory documentation management.

The shipping casks containing canisters will arrive at the site from the originating power plant either by rail or heavy haul tractor/trailer transport. When a shipping cask arrives at the site, the shipping cask, impact limiters, and shipping cradle will be visually inspected. Personnel will then transfer the shipping cask into a designated area to perform radiological monitoring. After the receipt inspection is complete, the shipping casks are transferred into the Facility restricted area and then into the Canister Transfer Building.

The transfer of the spent fuel canister from the shipping cask to the storage cask, via a transfer cask, will occur in the Canister Transfer Building. The transfer activities will use a combination of fixtures and equipment designed by the cask system vendors and equipment specifically designed for the Canister Transfer Building. After the storage cask has been loaded, the casks will be transferred from the Canister Transfer Building to the storage pad.

SAR Section 5.1 describes in detail the activities that will be performed to ensure that the stored casks do not endanger public health and safety. In summary, these activities include the following actions: after the storage casks are placed on the storage pad, the cask temperatures are measured periodically to ensure the temperature limits specified in the Technical Specifications for the specific cask design are not exceeded; security personnel control access to the storage area and identify/assess off-normal and emergency events during off-shift hours; health physics personnel ensure that the contamination levels are within the PFS Facility Technical Specifications; and maintenance personnel maintain the facilities including the storage casks, building equipment, buildings, emergency equipment, and transport systems.

The staff reviewed the operating functions described in SAR Chapters 1, 3, 4 and SAR Section 5.1 to ensure that the applicant adequately described the appropriate procedures, equipment, and personnel requirements. SAR Section 5.1 identifies the specific equipment and the personnel to accomplish the transfer, storage, and retrieval of the casks. The staff determined that the detailed procedure descriptions for operating, inspecting, and testing are consistent with the operation system.

The staff found the general description of the proposed Facility operations to be adequate. PFS Facility operations can be conducted without endangering the health and safety of the public and are, therefore, in compliance with 10 CFR 72.40(a)(5) and (13). Additionally, the SAR provides acceptable descriptions and discussions of the projected operating characteristics and safety considerations as required by 10 CFR 72.122(i). The staff found that the design and procedures provide acceptable capability to test and monitor components important to safety, in compliance with 10 CFR 72.128(a)(1).

The applicant's ALARA considerations are reviewed in Chapter 11 of this SER. Based on this review, the staff found that the design and operations consider ALARA, as required by 10 CFR 72.104(b). Radiological alarm systems and direct radiation monitoring are also considered in the design in compliance with the requirements of 10 CFR 72.126(b–c).

3.1.2 Spent Nuclear Fuel Handling Systems

Handling of the HI-STORM 100 Cask System, including the MPC, are described in detail in the HI-STORM 100 Cask System FSAR (Holtec International, 2000), which the staff has previously reviewed and found acceptable (Nuclear Regulatory Commission, 2000a, 2000b). Handling operations at the Facility will be consistent with the handling operations described in the HI-STORM 100 FSAR.

3.1.3 Other Operating Systems

The description of the other operating systems were reviewed for conformance with the following regulations:

- 10 CFR 72.104(b) requires that ALARA is considered in the design.
- 10 CFR 72.122(k)(2) requires that emergency utility services be designed to permit testing and to permit the operation of associated safety systems.
- 10 CFR 72.122(k)(3) requires that proposed design of the Facility include provisions so that emergency power is provided to permit continued functioning of all systems essential to safe storage.
- 10 CFR 72.126(b) and (c) require that the design consider radiological alarm systems and direct radiation monitoring.

In Section 3.4.5 of the SAR, the applicant discusses the structures, systems, and components (i.e., security systems, standby electrical power, cask transport vehicles, flood prevention earthworks, fire protection systems, radiation monitoring systems, and temperature monitoring systems) classified as not important to safety, but having security or operational importance. The SAR states that the design of the structures, systems, and components classified as not important to safety comply with applicable codes and standards. Further, the SAR states that the structures, systems, and components classified as not important to safety will be compatible with structures, systems, and components classified as important to safety and be designed to a level of quality to ensure that they will mitigate the effects of off-normal or accident-level events, as required.

Radiological surveys are planned for all incoming canisters as normal receiving operations at the Facility. In the event contamination above the acceptance levels is discovered, the canister will be returned to the shipper.

The staff reviewed the description of the other operating systems described in Section 5.3, and relevant information in appropriate sections of Chapters 1 and 3. The applicant's ALARA considerations are reviewed in Chapter 11 of this SER. Based on this review, the staff found that the design and operations consider ALARA as required by 10 CFR 72.104(b). Radiological alarm systems and direct radiation monitoring are considered in the design, in compliance with the requirements of 10 CFR 72.126(b–c).

The proposed design of the Facility does not require utility systems during spent fuel storage. Therefore, the emergency utility services required by 10 CFR 72.122(k)(2) are not applicable. The proposed design of the Facility does not include systems and subsystems that require continuous electric power to permit continued functioning. Since the design of the Facility does not require emergency power, 10 CFR 72.122(k)(3) is also not applicable.

3.1.4 Operation Support Systems

The descriptions of the operation support systems were reviewed for conformance with the following regulations:

- 10 CFR 72.122(i) requires that instrumentation and control systems be provided to monitor systems that are classified as important to safety.

- 10 CFR 72.122(k)(1) requires that each utility system important to safety include redundant systems to maintain the ability to perform safety functions assuming a single failure.

- 10 CFR 72.122(k)(3) requires that proposed design of the Facility include provisions so that emergency power is provided to permit continued functioning of all systems essential to safe storage.

The applicant classifies the instrumentation systems to be used to periodically monitor the Facility as not important to safety. The operation of the Facility is passive and self-contained. These storage casks do not require any instrumentation and control systems to ensure safe operation when they are placed into storage. During operation of the Facility, however, temperatures of the storage casks will be monitored. These measurements will provide a means to assess the thermal performance of the storage casks. The temperature monitors to be used at the Facility will be equipped with data recorders and alarms located in the Security and Health Physics building. The temperature monitors are not classified as important to safety. The storage casks to be used will be passively cooled; therefore, failure of a temperature monitor does not initiate an off-normal or accident condition. In addition, a periodic check for air cooling effectiveness is included as a technical specification. The proposed design of the Facility does not require utility systems during spent fuel storage. As stated above, the proposed design of the Facility does not include systems and subsystems that require continuous electric power to permit continued functioning and the design of the Facility does not require emergency power.

The staff reviewed the proposed operation support systems described in Section 5.4 of the SAR. In addition, the staff evaluated SAR Section 5.1 and appropriate sections in Chapters 3, and 8 of the SAR that identify the structures, systems, and components important to safety. The staff agrees that instrumentation systems to be used to periodically monitor the Facility are appropriately classified as not important to safety; therefore, 10 CFR 72.122(i) is not applicable. The staff found that the proposed self-contained, passive storage facility requires no permanently installed auxiliary systems. All auxiliary systems required to support loading and off-loading the system, periodic monitoring, and maintenance are designed to be portable systems. The systems are not important to safety and therefore 10 CFR 72.122(k)(1) is not applicable. Additionally, as stated above, the requirements of 10 CFR 72.122(k)(3) are not applicable because the design of the Facility does not require emergency power for systems essential to safe storage, and there are no systems essential to safe storage requiring electrical power.

3.1.5 Control Room and Control Area

The descriptions of the control room and control area were reviewed for conformance with the following regulation:

- 10 CFR 72.122(j) requires that, if appropriate, a control room or control area must be designed to permit occupancy and actions to be taken to monitor the ISFSI under normal conditions and provide safe control under off-normal and accident conditions.

The storage casks are passive storage systems. The control room and control area are not necessary to maintain the conditions required for safe operation of the Facility, to store spent fuel safely, prevent damage to the spent fuel during handling and storage, or provide reasonable assurance that the spent fuel can be received, handled, packaged, stored and retrieved without undue risk to the health and safety of the public.

The staff reviewed the control room and control areas described in Section 5.5 of the SAR. In addition, the staff has evaluated sections pertaining to monitoring instruments, limits and controls of the proposed cask systems from Chapters 1, 3, 4, 5, and 10 of the SAR. The staff found that the control room and control area are not important to safety. The Facility is a self-contained, passive storage facility that requires no permanent control room or control area to ensure safe operation; therefore, the requirements of 10 CFR 72.122(j) are not applicable.

3.1.6 Analytical Sampling

As discussed in the SAR, no analytical sampling is required. The HI-STORM 100 Cask System design will preclude release of effluents for normal, off-normal, and accident conditions during storage.

Prior to opening the shipping cask, the gas inside should be sampled to verify that canister confinement boundary is intact. The staff has determined that a license condition to this effect should be imposed.

3.1.7 Shipping Cask Repair and Maintenance

The shipping cask that will be used to transport the spent fuel to and from the Facility must be approved under 10 CFR Part 71. Repair or maintenance of such cask must be conducted in accordance with the requirements specified in the 10 CFR Part 71 certificate of compliance for that cask.

3.1.8 Pool and Pool Facility Systems

The Facility utilizes the dry cask storage technology, which houses spent fuel inside sealed, inerted canisters rather than in a spent fuel pool. Therefore, neither the use of a pool nor any system supporting a pool is incorporated into the Facility.

3.2 Evaluation Findings

The staff found that the proposed operating procedures are adequate. PFS Facility operations meet the regulatory requirements and can be conducted without endangering the health and safety of the public. Therefore, the staff found that the operation system description is acceptable.

License Condition

LC3-1 Prior to removing the shipping cask closure lid, the gas inside the cask shall be sampled to verify that canister confinement boundary is intact.

3.3 References

Holtec International. 2000. *Final Safety Analysis Report for the Holtec International Storage and Transfer Operation Reinforced Module Cask System (HI-STORM 100 Cask System).* Volumes I and II. HI–2002444. Docket No. 72-1014. Marlton, NJ: Holtec International.

Nuclear Regulatory Commission. 1989. *Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation or Monitored Retrievable Storage Installation (Dry Storage).* Regulatory Guide 3.48. Washington, DC: Nuclear Regulatory Commission, Office of Nuclear Regulatory Research.

Nuclear Regulatory Commission. 2000a. 10 CFR Part 72 *Certificate of Compliance No. 1014, Amendment 0, for the HI-STORM 100 Cask System.* Docket No. 72-1014. May 31.

Nuclear Regulatory Commission. 2000b. *Holtec International HI-STORM 100 Cask System Safety Evaluation Report*. Docket No. 72-1014. May.

Parkyn, J.D. 1998. *Response to Request for Additional Information*. Letter (May 19) to Director, Office of Nuclear Material Safety and Safeguards, Nuclear Regulatory Commission. La Crosse, WI: Private Fuel Storage Limited Liability Company.

Parkyn, J.D. 1999. *Response to Request for Additional Information*. Letter (February 10) to Director, Office of Nuclear Material Safety and Safeguards, Nuclear Regulatory Commission. La Crosse, WI: Private Fuel Storage Limited Liability Company.

Private Fuel Storage Limited Liability Company. 2000. *Safety Analysis Report for Private Fuel Storage Facility*. Revision 18. Docket No. 72-22. La Crosse, WI: Private Fuel Storage Limited Liability Company.