APPENDIX A

PROPOSED TECHNICAL SPECIFICATIONS

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1.0 INTRODUCTION

These Technical Specifications govern safety of receipt, possession, storage, and shipping offsite of spent nuclear fuel at the Private Fuel Storage Facility (PFSF). The protection of the environment during these activities is also governed under the Technical Specifications. Operating controls and limits for spent fuel loading, canister closure, vacuum drying, helium backfilling, leak testing, and preparation for transportation of the canisters to the PFSF are not addressed in this section since these operations are performed at the originating nuclear power plants and not at the PFSF. These operating controls and limits are addressed in the vendors' shipping cask system SARs licensed under 10 CFR 71 and storage cask system SARs licensed under 10 CFR 72. These Technical Specifications have been developed in accordance with 10 CFR 72.44.

1.1 Definitions

The following definitions apply for the purpose of these Technical Specifications:

a. Administrative Controls - Provisions relating to organization; operating, emergency, and management procedures; record keeping, review, and audit; and reporting necessary to ensure that the operations involved in the movement, transfer, and storage of spent fuel at the PFSF are performed in a safe manner.

b. Design Features - Features of the facility associated with the basic design, such as materials of construction, geometric arrangements, and dimensions, which, if altered or modified, could have a significant effect on safety.

c. Fuel Assembly - The unit of nuclear fuel in the form that is charged or discharged from the core of a light-water reactor (LWR). Normally, will consist of a rectangular arrangement of fuel rods held together by end fittings, spacers, and guide tubes or tie rods.

d. Functional and Operating Limits - Limits on canister handling and storage conditions necessary to protect the integrity of the stored fuel, to protect employees against occupational exposures, and to guard against the uncontrolled release of radioactive materials.

e. Limiting Conditions - The minimum or maximum functional capabilities or performance levels of equipment required for safe operation of the facility.

f. Surveillance Interval - A surveillance interval is the interval between a surveillance check, test, or calibration. Unless specifically stated otherwise, the specific frequency for each surveillance requirement is met if the surveillance is performed within 1.25 times the interval specified in the frequency, as measured from the previous performance.

For frequencies specified as "once", the above interval extension does not apply.

g. Surveillance Requirements - Surveillance requirements include: (1) inspection, test, and calibration activities to ensure that the necessary integrity of required systems, components and the spent fuel in storage is maintained; (2) confirmation that operation of the installation is within the required functional and operating limits; and (3) a confirmation that the limiting conditions required for safe storage are met.

2.0 FUNCTIONAL AND OPERATING LIMITS

2.1 Fuel Characteristics

Specification: The spent fuel selected for storage must comply with the specifications below and be independently verified and documented at the originating power plant prior to shipping. Documentation will be maintained at the PFSF identifying each cask, canister, and the fuel assemblies stored in the canister.

Type/Condition: PWR or BWR fuel assemblies listed in Tables 3.1-1 and 3.1-2, including MOX fuel and failed fuel confined in approved containers within the canisters, as specified by the storage cask vendors. See HI-STORM SAR section 12.3.1.4 for specifications for damaged BWR fuel.

Fuel Cladding: HI-STORM 100 System:

Zircaloy or Stainless Steel

TranStor Storage System:

Zircaloy or Stainless Steel

Initial Enrichment: HI-STORM 100 System:

PWR: See HI-STORM SAR Table 2.1.3 (Zircaloy) or Table 2.1.8 (stainless steel).

BWR: ≤ 4.2 wt% U-235, and bounded by HI-STORM SAR Figure 2.1.2 for fabricated Boron-10 loading.

TranStor Storage System:

PWR: See TranStor SAR Tables 12.2-2 and 12.2-3.

BWR: See TranStor SAR Tables 12.2-4 and 12.2-5.

Burnup:	HI-STORM 100 System: See HI-STORM SAR Figure 2.1.6 (Zircaloy) or Table 2.1.8 (stainless steel) for the allowable burnup based on assembly cooling time. TranStor Storage System: PWR: See TranStor SAR Tables 12.2-2 and 12.2-3 BWR: See TranStor SAR Tables 12.2-4 and 12.2-5
Cooling Time: (Post Irradiation)	HI-STORM 100 System: ≥ 5 years - See HI-STORM SAR Figure 2.1.6 (Zircaloy) or table 2.1.8 (stainless steel) for the assembly burnup versus cooling time. TranStor Storage System: ≥ 5 years - Cooling times for a given fuel assembly must be adequate to assure the decay heat of the assembly does not exceed the limits specified in the following paragraph. Representative minimum cooling times (for specified burnups) are provided in TranStor SAR Chapter 5, Table 5.1-1.
Decay Heat:	Decay heat is estimated based on DOE/RW-0184-R1, July, 1992 (or equivalent spent fuel database), using the characteristics of the spent fuel assemblies. HI-STORM 100 System: PWR: Zircaloy ≤ 1.177 kW per assembly Stainless steel ≤ 0.662 kW per assembly BWR: Zircaloy ≤ 0.3989 kW per assembly Stainless steel ≤ 0.079 kW per assembly

TranStor Storage System:

PWR: ≤ 1.083 kW per assembly

BWR: ≤ 0.426 kW per assembly

Fuel Assembly Weights: (incl. Control components)	PWR: ≤ 1680 lb BWR: ≤ 700 lb

Applicability: All PWR or BWR spent fuel to be stored at the PFSF.

Objective: To ensure the maximum fuel cladding temperatures, cask dose rates, and criticality conditions are within the vendor's design values.

Action: Fuel not meeting this specification shall not be accepted at the PFSF.

Basis: This specification is based on the design criteria and associated vendors' SARs for the storage systems utilized at the PFSF. It assures that the design basis remain valid by defining the type/condition of the spent fuel and limits on maximum initial enrichment, irradiation history, minimum post irradiation cooling time, and maximum decay heat. These limits protect the integrity of the spent fuel and the storage systems by ensuring that the storage system thermal, shielding, and criticality analyses are valid for fuel stored at the PFSF.

The limits therefore assure that dose rates associated with the transfer and storage casks do not exceed those analyzed. The maximum fuel assembly weights ensure that structural condition assumptions in the vendor's SARs bound those of the actual fuel being stored.

2.2 Canisters Authorized for Use at the PFSF

Specification: Two types of canisters are authorized for use at the PFSF, the HI-STORM canister and the TranStor canister. Canister designs will accommodate PWR or BWR fuel, including MOX fuel and failed fuel. The canisters are sealed by welding, vacuum dried, backfilled and pressurized with helium, and leak tested at the originating nuclear power plant, prior to shipment to the PFSF. This limitation assures that only canisters that comply with requirements specified by the vendors of these two spent fuel storage systems are transported to the PFSF. Documentation certifying the canisters are in compliance with vendor specifications is prepared at the originating nuclear power plants during spent fuel loading operations and shall be reviewed at the PFSF upon receipt of the canisters to confirm canisters meet the requirements of this specification.

Canisters received at the PFSF shall meet the following requirements, as confirmed by documentation accompanying the canister shipments:

1. Only canisters designed and fabricated in compliance with vendor specifications for Holtec's HI-STORM spent fuel storage system and SNC's TranStor spent fuel storage system are authorized for use at the PFSF. The steel canisters shall be designed and fabricated in accordance with Section III of the ASME code, as specified by the vendors in their storage system SARs.

2. The internals (baskets) of canisters received at the PFSF shall be designed as described in the vendor storage system SARs. Baskets authorized for use at the PFSF are the HI-STORM MPC-24 (PWR spent fuel), the HI-STORM MPC-68 (BWR spent fuel), the TranStor PWR basket, which stores up to 24 PWR spent fuel assemblies, and the TranStor BWR basket, which stores up to 61 BWR spent fuel assemblies. These basket configurations are described in detail and are the subject of analyses in the vendor's storage system SARs. No other basket configurations are permitted to be used at the PFSF.
3. Fuel assembly loading configurations in the above canister baskets shall conform to requirements specified by the vendors in their storage system SARs.
4. Prior to receipt at the PFSF, all canisters shall be vacuum dried, then backfilled and pressurized with helium to the pressures specified by the vendors in their shipping cask SARs.
5. Prior to receipt at the PFSF, all canisters shall be sealed by welding, with redundant closure welds as specified by the vendors in their shipping cask SARs.
6. Canisters shall be helium leak tested prior to shipment to the PFSF, and any leakage shall be less than the maximum allowable leak rates specified by the vendors in their shipping cask SARs.

Applicability: All loaded canisters received at the PFSF.

Objective: To assure that only those canisters that have been analyzed in the Vendors SAR are stored at the PFSF.

Action: If canisters are received at the PFSF that do not conform with the above requirements, arrangements shall be made for return of the canisters to the originating nuclear power plant. Nonconforming canisters shall not be removed from the shipping cask.

Basis: This specification assures that canisters received at the PFSF, which will be used in spent fuel storage and transfer operations, are in full compliance with vendor specifications and requirements, and that analyses associated with canisters in the PFSF SAR and vendor storage system SARs are valid for canister storage and transfer operations conducted at the PFSF. Storage of canisters not meeting these requirements is not allowed at the PFSF, as their use could be outside of previously analyzed conditions.

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2.3 Maximum Concrete Storage Cask Lift Height

Specification: The Concrete Storage cask lift height shall not exceed:

- 10 inches for the HI-STORM 100 storage cask.
- 18 inches for the TranStor storage cask.

Applicability: All concrete storage casks loaded with spent fuel at the PFSF.

Objective: To ensure storage casks are not lifted above the vendors' analyzed safe handling height.

Action: If the specified height is exceeded, immediately lower the cask to within the specification value.

Basis: The HI-STORM 100 and TranStor concrete storage cask vendors have determined that no unacceptable damage would occur to the storage cask in the event of vertical drops from the above specified heights. The canisters would retain their leak-tight integrity and continue to provide the confinement boundary; damage would not prevent removal of fuel assemblies; a criticality accident would not occur; and the concrete cask would retain its structural integrity and continue to provide physical protection and shielding of the canister. The vendors' storage cask safe handling height restrictions are described in Chapter 12 of their respective SARs.

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2.4 Minimum Temperature for Lifting the TranStor Transfer Cask

Specification: The transfer cask shall only be used to move the loaded canister if the transfer cask temperature is -3° F or above.

Applicability: All loaded canister transfer operations using a TranStor transfer cask.

Objective: To avoid the potential for brittle failure.

Action: Confirm that the transfer cask temperature is -3° F or above before using the transfer cask for transfer operations.

Basis: Nil ductility transition temperature / Charpy test requirements are addressed in Chapter 12 of the TranStor SAR.

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2.5 Ambient Temperature Limits for Handling a Loaded HI-TRAC Transfer Cask

Specification: The loaded HI-TRAC cask shall not be handled in an environment where the ambient temperature is below 32° F, except as noted below under action item a, or above 100° F.

Applicability: All loaded HI-TRAC transfer casks.

Objective: To avoid the potential for brittle failure and damage resulting from freezing of the neutron water jacket and to avoid exceeding the upper ambient temperature used in the thermal analysis.

Action:

a. If the ambient temperature is above 0° F and below 32° F, the HI-TRAC may be handled if either a thermal analysis has been performed demonstrating that the MPC decay heat will prevent freezing of the water jacket or a 25 percent solution of ethylene glycol and demineralized water is used in the water jacket. Otherwise do not handle the loaded HI-TRAC.

b. In the event that the ambient temperature is expected to reach or exceed 100° F, do not handle the loaded HI-TRAC.

c. In the event that the ambient temperature is expected to reach or go below 0° F, do not handle the loaded HI-TRAC.

Basis: The HI-TRAC thermal analysis is based on an upper ambient temperature of 100° F. Operating the HI-TRAC at or below 32° F may lead to freezing and subsequent damage to the neutron shield jacket. Handling the HI-TRAC below an ambient temperature of 0° F may present a risk of brittle fracture.

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2.6 Placement of Concrete Storage Casks on the Storage Pad

Specification: All loaded concrete storage casks shall be placed in a storage array with a minimum center-to-center spacing of 15 ft. The cask centerline shall also be a minimum of 7 ft, 6 in from any edge of the storage pad.

Applicability: All loaded concrete storage casks.

Objective: a. To ensure the storage casks thermal margins are not exceeded.
b. To ensure the cask remains on the pad and does not impact with another cask during a seismic event.

Action: The center-to-center and distance to edge of pad spacing shall be measured upon initial storage cask placement. After a seismic event of magnitude greater than 5.0 Richter at the PFSF, as determined by the National Earthquake Information Center, Golden, CO., verify spacing specified above. If required, restore center-to-center and distance to edge of pad spacing.

Basis: The thermal analysis for the storage cask system utilizes the above specified spacing. Additionally, seismic analysis shows that this spacing will prevent any storage cask impact during a seismic event.

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3/4 LIMITING CONDITIONS FOR OPERATION/SURVEILLANCE REQUIREMENTS

3/4.1 Canister External Surface Contamination

Specification: The removable surface contamination on the outer surface of the canister shall be less than 22,000 dpm/100 sq cm from beta and gamma and less than 2,200 dpm/100 sq cm from alpha emitting sources.

Applicability: All canisters containing spent fuel at the PFSF.

Objective: To assure contamination control prior to handling the canister and placing it in the storage cask.

Action: If the above specified limits are exceeded, return the canister and shipping cask to the originating nuclear power plant for decontamination.

Surveillance: A contamination survey for removable surface contamination shall be taken on the accessible external surfaces of the canister. The survey shall be conducted after the shipping cask lid is removed and before removing the canister from the shipping cask.

Basis: Specified values are consistent with the requirements of 49 CFR 173.443 for transporting spent fuel shipping containers.

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3/4.2 Concrete Storage Cask External Dose Rate

Specification: HI-STORM 100 System:

The total contact dose rates on the loaded HI-STORM Storage Cask shall be:

1. Less than 45 mrem/hr when measured around the mid-height axial plane,
2. Less than 20 mrem/hr when measured at the top center of the lid, and
3. Less than 70 mrem/hr when measured at the center of the air inlet and outlet vent screens.

TranStor System:

The dose from all types of radiation one meter from the cask surface shall be:

1. Less than 15 mrem/hr on the side and 200 mrem/hr on the top for Zircaloy clad fuel, and
2. Less than 30 mrem/hr on the side and 200 mrem/hr on the top for stainless steel clad fuel.

Applicability: All storage casks loaded with spent fuel at the PFSF.

Objective: To verify acceptable fuel has been loaded into the canister and to maintain dose rates ALARA.

Action: If the measured dose rate exceeds the specification, the fuel loading records shall be reviewed and verified to be in compliance with section 2.1 of these technical specifications. If the fuel loading is correct, an analysis shall be utilized to determine acceptable onsite and offsite dose levels to demonstrate compliance with 10 CFR 20 and 10 CFR 72 radiation protection requirements. Portable shielding may be used to lower the dose rates within acceptable limits.

Surveillance: Measure the dose rates prior to moving the loaded storage cask to the PFSF storage area.

Basis: The specified dose limits are consistent with the dose levels shown in HI-STORM SAR Section 12.3.16 and TranStor SAR section 12.2.1.3 and establish maximum levels that are deemed ALARA and acceptable for PFSF personnel.

3/4.3 Concrete Storage Cask Air Outlet Temperature-Initial Installation

Specification: The equilibrium air temperature, after initial installation, at the outlet of a loaded storage cask shall not exceed ambient by more than 125° F for the HI-STORM storage cask and 100° F for the TranStor storage cask.

Applicability: All storage casks loaded with spent fuel at the PFSF.

Objective: To ensure that the air vents are operable and that the temperatures of the fuel cladding, canisters, and the storage cask concrete do not exceed their specified limits.

Action: If the cask outlet temperature is greater than the values specified above, the first action is to check all inlet and outlet ducts for airflow blockage. If environmental factors are ruled out as the cause of the excessive air temperature, and the correct fuel loading has been verified, then this condition is not addressed in the SAR and will require additional temperature measurements and/or analysis to justify acceptability of the actual cask performance.

Surveillance: TranStor Storage System:
To verify proper operation of the loaded storage cask, temperature measurements shall be conducted at intervals not to exceed 26 hours until the cask has reached equilibrium. The air temperature shall be the average of measurements at all four outlets.

HI-STORM System 100:

Temperature measurements shall be conducted at the intervals listed below:

1. Immediately following the installation of the lid.
2. 24 hours after the installation of the lid.
3. 7 days after installation of the lid.

Basis: The vendors' storage cask thermal analyses are described in their respective storage cask system SARs. These analyses ensure that the fuel cladding, canister, and cask concrete will be maintained at temperatures below material degradation levels.

3/4.4 Concrete Storage Cask Air Vent Operability

Specification: Air vent operability shall be determined by monitoring cask temperatures as indicated below:

1. The HI-STORM lid bottom plate temperature (as measured by an installed thermocouple) shall not exceed 368° F above ambient temperature.
2. The TranStor storage cask inner liner temperature (as measured by an installed thermocouple) shall not exceed 126° F above ambient temperature.

Applicability: All storage casks loaded with spent fuel at the PFSF.

Objective: To ensure that the air vents are operable and that the long-term temperature of the fuel cladding and the storage cask concrete do not exceed their specified limits.

Action: In the event the above specified temperatures are exceeded, the following actions shall be taken within 24 hours:

1. Inspect all air inlets and outlets on the subject storage cask for obstructions. Remove any obstructions. Repair or replace damaged screens as applicable.
2. Check, repair, or replace faulty thermocouples.
3. Recommence surveillance.

Surveillance: Storage cask temperatures shall be monitored continuously utilizing permanently installed thermocouples.

Basis: The vendors' storage cask thermal analyses are described in their respective storage cask system SARs. These analyses ensure that the fuel cladding and cask concrete will be maintained at temperatures below material degradation levels.

5.0 DESIGN FEATURES

5.1 Site

The PFSF is located on the Skull Valley Indian Reservation approximately 27 miles West-Southwest of Tooele City. The site is accessible by a county road which runs from interstate 80 past the reservation. A description of the site and its environs is provided in Chapter 1 of the PFSF SAR.

5.2 Storage System

The spent fuel will be stored in a sealed canister which is protected and shielded by a ventilated concrete cask. The Sierra Nuclear Corporation TranStor system and the Holtec HI-STORM 100 cask system will be the storage systems utilized at the PFSF. The design features and details are provided in the Safety Analysis Reports prepared by SNC and Holtec for their respective systems.

5.3 Cask Storage Pad

The cask storage pads are independent structural units constructed of reinforced concrete. Each pad is 30 ft wide by 64 ft long and 3 ft thick. The size of the pad is based on a minimum center to center spacing of 15 ft-0 in for the storage cask. Each of the 500 cask storage pads is capable of supporting 8 loaded concrete storage casks. The design details for the storage pads are provided in Chapter 4 of the PFSF SAR.

5.4 Canister Transfer Building

The Canister Transfer Building is a one story, high-bay structure that houses the canister transfer cranes, the shipping cask receiving and shipping, storage cask staging, and canister transfer operations. The building has reinforced concrete walls and a roof with steel beams supporting metal decking and concrete. The building provides physical protection and radiological shielding during the transfer operations. Detailed design information for the Canister Transfer Building is provided in Chapters 3 and 4 of the PFSF SAR.

5.5 Canister Transfer Cranes

Two cranes are provided in the Canister Transfer Building to perform all the necessary lifting and placement operations associated with canister off loading and transfer. The overhead bridge crane has a capacity of 200 tons while the semi-gantry crane has a capacity of 150 tons. Both cranes are single-failure-proof in accordance with NUREG-0554. Detailed design information for both cranes is provided in Chapters 3 and 4 of the PFSF SAR.

6.0 ADMINISTRATIVE CONTROLS

The administrative controls identify the organization, review requirements, procedures, record keeping, and reporting requirements to ensure that the PFSF is managed in a safe and reliable manner. These controls also specify the administrative action which must be taken in the event of non-compliance with a limit or condition specified in these PFSF Technical Specifications. Details of the staffing and administrative controls for the PFSF are included in Chapter 9 of the PFSF SAR.

6.1 Responsibility

The PFSF General Manager shall be responsible for overall facility operation in accordance with these specifications and applicable government regulations, and shall delegate in writing the succession of this responsibility during his absence.

6.2 Organization

The facility staff organization is described in Section 9.1 of the PFSF SAR.

6.3 Safety Review Committee

The PFSF Safety Review Committee shall be responsible for reviewing and advising the Board of Managers on all matters relating to Structures, Systems, and Components (SSCs) Important to Safety. The committee's responsibilities shall include but not be limited to the review of:

- Safety evaluations for procedures and changes thereto,
- Changes to SSCs classified as Important to Safety,

- Tests or experiments involving SSCs classified as Important to Safety,
- Review of QA audits related to Safety,
- Proposed changes to the technical specifications or the license, and
- Violations of codes, regulations, orders, license requirements, or internal procedures/instructions which pertain to SSCs classified as Important to Safety.

The committee shall consist, as a minimum, of members from the following functional areas:

Chairperson: PFSF General Manager/Chief Operating Officer
Quality Assurance
Radiation Protection
Nuclear Engineering
Maintenance/Operations

An alternate chairperson and alternate members shall be designated in writing by the committee chairperson; however no more than two alternate members may vote at any one time. Three committee members, including alternates, constitute a quorum.

The committee shall meet at least once prior to receiving spent fuel at the PFSF. During normal operations of the PFSF the committee shall meet at least once every six months and any other time deemed necessary by the committee chairperson.

6.4 Plans and Procedures

6.4.1 Plans and Procedures

Plans and procedures shall be established and implemented to assure compliance with the Technical Specifications and applicable governmental regulations. Plans and procedures required by this section shall include, but not be limited to the following:

a. An emergency plan that defines responsibilities and specifies actions, including communication channels, required to address credible emergencies and off-normal conditions.

b. A physical security and contingency plan.

c. A fire protection plan.

d. Facility change and modification control procedures for PFSF structures, systems, and components.

e. Procedures for training and certification of PFSF personnel.

f. A decommissioning plan.

g. Procedures to account for spent nuclear fuel stored at the PFSF.

h. Procedures governing personnel exposure protection and records.

i. Procedures for operating the PFSF and performing required surveillances.

6.4.2 Changes to Plans and Procedures

All changes or revisions to established plans or procedures required by this section shall be made in accordance with PFSF administrative controls.

6.5 Actions Required for Specification Non-Compliance

If it is determined that a Technical Specification requirement has not been met, any actions required by the specification shall be performed first, then the following actions shall be taken:

a. Corrective action shall be taken to assure timely return of operations to specification compliance.

b. The PFSF General Manager or designee shall be advised of the non-compliance within 24 hours.

c. For non-compliance with a Functional and Operating Limit (Section 2.0), notification of the NRC shall be made within 24 hours.

d. For all other specification non-compliance's, notification of the NRC Regional Office shall be made at the time of the next inspection to advise them of events that resulted in a Technical Specification requirement having been violated.

6.6 Logs, Records, and Reports

6.6.1 Logs and Records

a. A shift log shall be maintained during handling activities of containers containing fuel at the PFSF, to record routine, non-routine, and significant events that may occur during a shift.

b. Records of facility design changes, and changes in procedures described in the PFSF SAR, including written safety evaluations that provide the bases for determining that the test or experiment did not involve unreviewed safety or environmental questions, shall be maintained until the PFSF supporting license is terminated.

c. Records of tests or experiments conducted at the PFSF, including written safety evaluations, shall be maintained until the PFSF license is terminated.

d. Material balance, inventory, and records requirements for stored materials will be maintained in accordance with the requirements of 10 CFR 72.72.

6.6.2 Reports

In accordance with requirements of 10 CFR 72.48, an annual report shall be made to the NRC summarizing changes, tests and experiments, including safety evaluations, conducted without prior approval by the NRC.

Annual radioactive effluent release reports shall be submitted in compliance with the requirements of 10 CFR 72.44(d)(3). The report shall specify the quantity, if any, of each of the principal radionuclides released to the environment in liquid and in gaseous effluents, and such other information as may be required by the NRC to estimate maximum potential dose commitment to the public resulting from effluent releases.

APPENDIX B

PRELIMINARY DECOMMISSIONING PLAN

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CHAPTER 1
INTRODUCTION

Prior to the end of the Private Fuel Storage Facility (PFSF) life, the sealed canisters containing spent fuel elements will be transferred from storage casks into shipping casks and transported off site. Since the canisters are designed to meet DOE guidance applicable to multi-purpose canisters for storage, transport and disposal of spent fuel, the fuel assemblies will remain sealed in the canisters such that decontamination of the canisters is not required. Following shipment of the canisters off site, the PFSF will be decommissioned by identification and removal of any residual radioactive materials above the applicable NRC limits for unrestricted. The site may then be released for unrestricted use and the NRC license terminated.

This Preliminary Decommissioning Plan has been prepared to comply with the requirements of 10 CFR 72.30, and describes the conceptual program for decontamination and decommissioning of the PFSF, including the approaches, elements and cost estimates associated with decommissioning. The specific methods and details of PFSF decommissioning will be included in a final decommissioning plan, which will be submitted for NRC review and approval prior to the commencement of decommissioning activities.

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CHAPTER 2

DECOMMISSIONING OBJECTIVE, ACTIVITIES, AND TASKS

2.1 Decommissioning Objective

The objective of decommissioning activities for the PFSF is to remove all radioactive materials having activities above the applicable NRC release limits in order that the site may be released for unrestricted use, and the NRC license terminated.

2.2 Decommissioning Activities

Detailed information and procedures for decommissioning activities will be provided in a final decommissioning plan. The extent of any required decontamination efforts is not capable of being quantified at this time, especially in light of the facility's "start clean/stay clean" philosophy and the efforts that will be taken throughout the life of the facility to minimize the potential for any contamination. Actual decontamination efforts and sequences of work will depend on facility operating history and whether any contamination actually exists. The descriptions presented here provide a conceptual plan for detailed engineering and planning which will occur at the end of facility operations.

It is not anticipated that either the storage casks or the storage pads will have residual radioactive contamination once the canisters are removed because: 1) the canisters are sealed by welding that precludes leakage of canisters, 2) measures are applied at the originating reactors when fuel is loaded into the canisters to prevent contamination of the canister outer surfaces, 3) the canisters are not permitted to be transported to the PFSF unless surveys determine that surface contamination levels are below specified limits, and 4) neutron flux levels generated by the spent fuel are sufficiently low that activation of storage cask and pad materials will be insignificant, with radiation levels well below the applicable NRC criteria for unrestricted release of equipment/materials.

It is anticipated that the fences and peripheral utility structures will not be contaminated and will therefore require no decontamination or special handling, and will be left in place or removed as determined with the landowner.

The PFSLLC will submit a final decommissioning plan to the NRC at least one year prior to the final removal of spent fuel canisters from the site, and in no case later than one year prior to the expiration of the NRC operating license. The final decommissioning plan will address decontamination of the site, removal of radioactive materials and termination of the facility operating license, and will include a description of the decommissioning organization, staffing, schedule, and procedures, and a description of how the PFSF will continue to protect the public health and the environment during decommissioning. In developing the final decommissioning plan, the NRC regulatory criteria for decommissioning will be reviewed against the existing technical specifications, and modifications, revisions or deletions will be proposed as applicable. Decommissioning activities will be planned using ALARA goals and criteria for protection of personnel from exposure to radiation and radioactive material. The final decommissioning plan will include information on the following:

- Site preparation and organization,
- Procedures and sequences for removal of systems and components,
- Decontamination procedures,
- Design, procurement and testing of any special equipment,
- Identification of outside contractors to be utilized,
- Procedures for removal and disposal of radioactive materials,
- A schedule of activities.

2.3 Decommissioning Tasks

Prior to the commencement of PFSF decommissioning activities, the spent fuel canisters stored at the PFSF will be shipped off-site in licensed shipping casks. The empty storage cask will then be surveyed to determine activation and contamination levels. Storage casks with activation and contamination levels below the applicable NRC limits for unrestricted release will be disposed of as non-controlled material. Contaminated storage casks will be decontaminated to the extent practicable using conventional methods, and casks which have been decontaminated below the applicable NRC limits for unrestricted release will be disposed of as non-controlled material. Storage casks with contamination or activation levels above the applicable NRC limits for unrestricted release will be dismantled, with the activated or contaminated portions segregated and disposed of as low level waste. The portions or components of the cask which are below the applicable NRC limits for unrestricted release will be disposed of as non-controlled material. Storage cask decontamination and decommissioning may be performed at any time following the removal of the canister. This will allow storage cask decommissioning efforts to be essentially complete by the end of canister shipping operations. The shipping casks and transfer casks will be similarly decommissioned after they are no longer required for facility operations.

Characterization surveys will be performed to verify the storage pads and site areas are free of contamination; with radiation and radioactivity levels below the applicable NRC limits for unrestricted release. In the unlikely event that the characterization surveys identify contamination levels above the applicable NRC limits for unrestricted release, the structures or components will be decontaminated using conventional decontamination techniques that minimize the volume and processing of the resulting radwaste. All low level radioactive waste generated during decontamination efforts and portions of any structures or components which remain contaminated will be shipped off site for disposal at an appropriate licensed facility.

After all spent fuel canisters have been shipped from the PFSF and all storage, shipping and transfer casks decommissioned, a detailed radiological characterization survey will be performed of the Canister Transfer Building, with particular attention focused on any areas of known or historic contamination. Canister Transfer Building equipment or structures which may have contamination levels above the applicable NRC limits for unrestricted release will be decontaminated to the extent practicable using conventional methods. All radioactive material above the applicable NRC limits for unrestricted release will be removed from the site and disposed of as low level waste. A final radiation survey will be conducted to assure that all radioactive materials have been removed from the site.

2.4 Decommissioning Organization

The development of a decommissioning staff within the PFSLLC organization will be essential to the successful planning and execution of the decommissioning plan, and will include identification of staff requirements and securing the commitment of key personnel.

Certain decommissioning activities may be performed by contractors. The PFSF will provide information on the scope of work, the contractor qualifications to work with radioactive materials, and administrative controls to ensure the health and safety are protected. Activities performed by a contractor will be performed under the procedures and controls of the NRC license for the PFSF, and no separate need for licensing of contractors is anticipated.

CHAPTER 3
DECOMMISSIONING RECORDS

The following records will be maintained until the PFSF is released for unrestricted use, in accordance with 10 CFR 72.30(d), and will be used to plan the actual decommissioning efforts:

- Records of spills or off-normal occurrences involving the spread of contamination,
- As-built drawings and modifications of structures and equipment involved in the use and/or storage of radioactive materials, and locations of possible inaccessible contamination,
- A document, which is updated a minimum of every 2 years, containing a list of all areas designated at any time as restricted areas, and a list of all areas outside of restricted areas involved in a spread of contamination,
- Records of decommissioning cost estimates and the funding method used.

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CHAPTER 4

DECOMMISSIONING COST ESTIMATE

Decommissioning the PFSF will be a multiphased effort, with portions completed during the operational phase. The amount of decontamination required and the extent of decommissioning efforts will be based on the usage and history of the facility. The cost of decommissioning major portions and components of the facility is outlined here as a means to estimate the total cost of decommissioning the facility.

The philosophy of operating the PFSF is "start clean, stay clean." Thus the intention is to maintain the facility free of radiological contamination at all times. During the operational phase of the facility, all radioactive contamination will be removed immediately upon its discovery. The cost estimate for decommissioning nonetheless conservatively assumes that certain areas and components will require decontamination. The areas of possible contamination concern and the projected decontamination and decommissioning costs are discussed below.

Shipping Casks: The shipping casks will not become activated because of the relatively short duration of their exposure to the spent fuel canisters. In the event a shipping cask becomes contaminated, the cost of decontamination is estimated to be $50,000. Four shipping casks from each of the two vendors, for a total of eight casks, will require $400,000 for decommissioning.

Storage Casks: The storage casks vendors have indicated there will be no anticipated activation of cask materials. Measures will be taken at the originating reactors and upon arrival of the canisters at the PFSF to ensure the canisters will have surface contamination levels below specified limits before being loaded into storage casks, thereby minimizing the possibility of contaminating the storage casks. It is therefore anticipated that the storage casks will have no radioactive contamination or activation. In order to conservatively account for the unlikely event that a storage cask is found to have contamination or activation levels above the applicable NRC limits for unrestricted release, an estimate has been made of costs to decontaminate and dispose of a storage cask.

The inside surface of a storage cask is 365 square feet and the initial decontamination is estimated to cost $365 plus waste disposal costs of $550. If surveys show the cask has fixed contamination or activation, a series of three core borings at an estimated total cost of $850 will be performed to determine the nature and extent of activation or fixed contamination, i.e., whether it is the steel liner, concrete shielding or both. If the steel liner is activated, it will be removed and sectioned for shipment off site to a licensed disposal facility. Assuming the maximum portion of a storage cask liner which could have residual activation or contamination is 20%, it will cost an estimated $3,000 for dismantlement and packaging efforts, $1,400 for shipping the low level waste off site and $8,120 for disposal fees. If the storage cask concrete is activated, it will be scabbled at an estimated cost of $1,704, and the activated concrete would be disposed of at an estimated cost of $270. The total cost to decommission a storage cask is estimated to be less than $17,000.

<u>Site Characterization Survey</u>: At the end of facility operations, a radiological survey of the entire PFSF site will be performed in order to verify the absence of contamination

and to identify any areas requiring decontamination. The cost of this survey is estimated to be $250,000.

Canisters: The spent fuel canisters will be shipped off-site prior to the commencement of facility decommissioning. These activities are considered part of PFSF operations, and and the associated costs are therefore not included in the decommissioning cost estimate.

Transfer casks: There will be four transfer casks; two for each vendor design, one of which will be used at the PFSF and the other which will be used at the various reactor sites. The transfer casks will not become activated due to their relatively short duration of exposure to the spent fuel canisters, but they may become contaminated. The final decontamination and dismantlement of the transfer casks is estimated to cost $50,000 per cask in labor and material disposal costs, for a total of $200,000.

Canister Transfer Building: For the purpose of preparing a decommissioning cost estimate, the Canister Transfer Building operations area of 46,000 square feet is assumed to require decontamination. The cost of decontamination is estimated to be $5 per square foot for labor, materials and waste disposal. The total estimated cost to decommission the Canister Transfer Building is $230,000.

Storage pads: The concrete storage pads will only be used for sealed storage casks and it is not anticipated that they will become activated or contaminated. The only mechanism which could result in contamination of a storage pad is by having a contaminated canister which was not detected prior to insertion in a storage cask. The possibility of such an occurrence is remote, but is addressed for decommissioning purposes by assuming up to 10 percent of the storage pad area will require surface decontamination. The maximum number of storage pads is 500, with each having an area of 64 ft by 30 ft, for a total area of 960,000 square feet. Ten percent of this area is 96,000 square feet, which takes no credit for the area protected by the bottom of each storage cask. Decontamination of this area is estimated to cost $96,000, and disposal of the waste produced is estimated to cost $145,000. The total estimated cost to decontaminate the storage pads is $241,000.

Final Site Survey: A final site survey will be performed to verify decontamination and decommissioning efforts and the absence of radioactive materials which is estimated to cost $260,000.

Independent Verification Survey: This survey, to be performed by a contractor selected by the NRC, is a validation of the results of the final site survey, and is estimated to cost $50,000.

The total estimated cost of PFSF decommissioning is estimated to be $1,631,000 plus $17,000 per cask for each storage cask actually utilized.

CHAPTER 5

DECOMMISSIONING FUNDING PLAN

The method of funding for decommissioning activities consists of two components: prepayment of the costs for decommissioning the storage casks into an escrow account and a letter of credit coupled with an external sinking fund for the costs of decommissioning the remainder of the facility and site. These financial assurance mechanisms will be prepared in conformance with the guidance of NRC Regulatory Guide 3.66.

5.1 Storage Cask Decommissioning Funding Plan

The service agreement with each customer (reactor) shall require at least $17,000 to be deposited into an externalized escrow account prior to shipment of each spent fuel canister to the PFSF. The full amount of potential decommissioning costs will thus be collected in a segregated account prior to the receipt of each spent fuel canister at the PFSF. This method of funding provides for prepayment of the storage cask decommissioning costs prior to any potential exposure of the storage cask to radiation or radioactive material, and therefore prior to the need for any decommissioning. This funding method complies with the requirements of 10 CFR 72.30(c)(1).

Storage cask decontamination and decommissioning may be performed at any time following the removal of the canister and its shipment off site. This will allow individual storage cask decommissioning to be an ongoing effort, which can potentially be completed by the end of canister shipping operations. As storage cask decommissioning is completed, the amount of funds in the escrow account will be adjusted periodically to reflect the remaining decommissioning efforts. The escrow amount and the per-canister fee will be reviewed and adjusted annually to account for inflation and any changes in the estimated cost of storage cask decommissioning.

5.2 Facility and Site Decommissioning Funding Plan

A letter of credit will be obtained in the amount of $1,631,000 to cover the estimated facility and site decommissioning costs, exclusive of the storage casks. This amount includes $250,000 for a site characterization survey, $200,000 for decommissioning of four transfer casks, $400,000 for decommissioning of eight shipping casks, $230,000 for decontamination of the Canister Transfer Building, $241,000 for storage pad decontamination, $260,000 for a final release survey, and $50,000 for an independent verification survey. This letter of credit will be coupled with an external sinking fund into which customers will be required under the service agreements to pay the costs to decontaminate any portion of the facility for which they may be responsible for contaminating. When the actual costs of decontamination and decommissioning are paid into the external sinking fund, the letter of credit may be reduced by an equivalent amount.

The amounts in the external sinking fund and the letter of credit will be reviewed and adjusted annually to account for inflation and any changes in the scope or cost of decommissioning. This funding method complies with the requirements of 10 CFR 72.30(c)(3).

CHAPTER 6
DECOMMISSIONING FACILITATION

The design features of the dry cask storage system utilized at the PFSF provide for the inherent ease and simplicity of decommissioning the facility in conformance with 10 CFR 72.130. A "start clean / stay clean" philosophy will be implemented for the PFSF.

Radioactive materials associated with spent fuel assemblies are contained within the canister, which is sealed by welding at the originating reactor. The canister conforms to requirements of Section III of the ASME code, and provides assurance that radioactive material will not leak from the canister over the life of the PFSF. The sealed canisters are not opened at the PFSF.

Measures to assure the canister external surfaces are maintained in a clean condition are implemented during the canister loading operations at the originating reactor. These measures prevent contaminated fuel pool water from contacting the external surfaces of the canister. Following fuel loading operations, a swipe survey is performed on the canister lid and on the transfer cask internals (representative of removable contamination levels on outside of the canister) at the originating nuclear power plants. The canister is not permitted to be transported to the PFSF if removable contamination levels exceed defined limits. Therefore, it is expected that canisters arriving at the PFSF will have minimal, if any, contamination of external surfaces. Since the canisters are sealed to preclude release of radioactive material from inside the canisters, minimizing contamination on the external surfaces of the canisters received at the PFSF minimizes the quantity of radioactive waste and contaminated equipment at the PFSF.

The storage casks that house the canisters are clean and have no radioactive contamination when they are fabricated. Under normal conditions of canister transfer and storage operations, the potential does not exist for contaminating the storage casks. Health physics technicians monitor the canister transfer operations, and perform swipe surveys of the shipping cask, canister lid, transfer cask and storage cask following each canister transfer operation. Storage casks with contamination levels on their outer surfaces above those established by administrative controls to prevent the spread of contamination to the storage pads will be decontaminated prior to their movement to the storage pads. These measures help to prevent the spread of any contamination from the Canister Transfer Building to the storage pads so that the concrete storage pads will remain free of contamination.

The design of the storage cask facilitates its decontamination, if necessary, since bare concrete (which is porous and relatively difficult to decontaminate) is not exposed to contamination. The cavities of both the HI-STORM 100 and TranStor storage casks are completely lined with steel, including the cylindrical walls, pedestal that supports the canister, and lid, making them relatively easy to decontaminate.

The neutron flux originating from a canister containing spent fuel assemblies having design burnup and cooling times is approximately 10 orders of magnitude lower than neutron flux levels at an operating nuclear power plant (1E3 versus 1E13 n/sec-cm^2), and consists of fast neutrons with energies around 1 MeV. The cask materials and pad concrete will be only very slightly activated (less than 5 micro-R per hour above background) as a result of their long-term exposure to the relatively small neutron flux emanating from the spent fuel, which will allow the general release of the casks as non-controlled material. Hence any tasks necessary to decommission storage casks are expected to involve only surface decontamination, if necessary, and not removal of activation products at depths below the surface.

The design of the transfer casks also facilitates their decontamination. These casks have layers of gamma (lead) and neutron shield materials sandwiched between steel. The inner and outer liners both consist of carbon steel, which is relatively easy to decontaminate. The sliding doors at the bottom of the transfer casks are also steel, or steel lined.

In order to facilitate decommissioning of the Canister Transfer Building, the concrete floor, as well as the interior surfaces of the concrete walls in the transfer cells and the low level waste storage area, will have a coating of special paint or epoxy applied, which is non-porous and easily decontaminated. This provision will help to assure that decontamination can be performed by wiping down surfaces or stripping the coating, without the need to use more aggressive methods (e.g. abrasive blasting, scabbling) that require removal of surface concrete.

Radioactive waste generated during decontamination operations will be packaged and temporarily staged for disposal in the low level waste holding area of the Canister Transfer Building. It is anticipated that this low level waste holding area will be decommissioned last, following decommissioning of the storage casks, pads, and the remainder of the Canister Transfer Building.

Minimal non-radioactive hazardous materials may be used or stored at the PFSF, and any that are needed to support PFSF operations will be identified and controlled in accordance with procedures. Strict measures will be applied to prevent any hazardous materials from contacting radioactive contamination, so that mixed hazardous and radioactive waste will not be generated at the PFSF.

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CHAPTER 7
REFERENCES

1. 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Fuel and High-Level Radioactive Waste."

2. NRC Regulatory Guide 3.66, "Standard Format and Content Of Financial Assurance Mechanisms Required For Decommissioning Under 10 CFR Parts 30, 40, 70, and 72," June 1990.

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