

RAS 10262

The PFSF project has been developed on a phased basis. Steps I and II, which involved preliminary investigations, predated the formation of the PFSLLC. Step III began with the formation of the PFSLLC and concluded with the filing of the License Application. This step was funded by direct payments to the PFSLLC from member utilities pursuant to Subscription Agreements. Step IV includes the NRC licensing proceeding as well as detailed design and preparation of bid specifications. The budget for Step IV is approximately \$23 million, including contingencies, to be funded by direct payments to the PFSLLC from the member utilities pursuant to Subscription Agreements. These Step IV payments will be made on a quarterly basis. Given the relatively small size of this payment for any participating utility, there is the reasonable assurance that the PFSLLC will obtain Step IV funding.

Step V represents the construction of the PFSF. The budget for this phase is \$100 million and includes site preparation; construction of the access road, administration building, security and health physics building, operations and maintenance building, canister transfer building and storage pads; procurement of canister transfer and transport equipment; and transportation corridor construction. The Step V budget also includes necessary personnel costs, licensing fees, and host benefits, as well as a contingency amount.

Step V will be funded through several mechanisms. An additional \$6 million in equity contributions is planned from PFSLLC members pursuant to Subscription Agreements. The bulk of the Step V costs is expected to be funded through Service Agreements with PFSF customers (including both PFSLLC members and non-members). Payments under each Service Agreement will be spread out over the period of time from construction through spent fuel delivery. No construction will proceed unless Service Agreements committing for a significant quantity of spent fuel storage have been signed. Raising the non-equity portion of Step V costs through Service Agreements will

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allow the PFSLLC to avoid financing costs for construction. The PFSLLC, however, retains the option to finance the non-equity portion of Step V costs through debt financing secured by Service Agreements. Construction of the facility shall not commence until funding (equity, revenue, and debt) is fully committed that is adequate to construct a facility with the initial capacity as specified by the PFS to the NRC. Construction of any additional capacity beyond this initial capacity amount shall commence only after funding is fully committed that is adequate to construct such additional capacity (Parkyn 1998, and Gaukler 1999). Therefore, unless PFSLLC members and non-members have committed to a significant quantity of storage, construction of the PFSF will not begin. Thus, there will be reasonable assurance that the PFSLLC will obtain Step V funding.

Step VI, the operational phase of the PFSF, will also be funded through the Service Agreements. The significant costs of this phase will include procurement and/or fabrication of canisters (\$432 million) and storage casks (\$134 million). These components will be obtained on an as-needed basis, to coincide with the schedule for moving spent fuel to the PFSF. All capital costs associated with the storage of any spent fuel will be paid by the customer pursuant to the Service Agreement prior to the acceptance by the PFSLLC of that spent fuel. PFSLLC shall not proceed with operation of the facility unless it has in place long-term Service Agreements with prices sufficient to cover the operating and maintenance costs of the facility, for the entire term of the Service Agreements, including amortization of any debt used to construct the facility (Gaukler 1999). Since the PFSF will not accept spent fuel for storage without prior payment through Service Agreements of the necessary capital costs for transportation and storage, there is reasonable assurance that the PFSLLC will obtain the necessary Step VI costs.

The on-going operations and maintenance cost for spent fuel in storage at the PFSF will be paid by the customer on an annual basis as required by the Service Agreements. The annual operations and maintenance cost is estimated to be \$49 million for a 20-year facility operating life and \$31 million for a 40-year life. The elements that make up the estimated annual operation and maintenance costs include the following: labor, operations support, storage canisters, storage casks, transportation fees, transport and storage consumables, maintenance and parts, regulatory fees, quality assurance and other expenses, low-level radioactive waste disposal, contingencies, radiological decommissioning funds, non-radiological decommissioning fund, and associated costs of operating a facility. Note that the O&M costs of \$49 million per year for a 20 year facility life and of \$31 million per year for a 40 year life include such high-priced items as the storage system canisters / casks and shipping rates. When these canister fees are extracted, the routine annual O&M costs are approximately \$10 million per year. The O&M costs noted above are based on a nominal design capacity case of 15,000 Mtu. All dollars expressed are in current year dollars at the time of the license application submittal (1997).

The customers of PFS will be signing Service Agreements, which will include escalators that are tied to specific costs of doing business at the site. Services, such as labor and utilities, will be tied to nationally published indices for the regional area in Utah. Costs, such as Nuclear Regulatory Commission and insurance fees, will be escalated at actual escalation numbers. Therefore, customers will be responsible for the actual costs of ensuring operating and maintenance funding for the facility on a year-by-year basis as long as their fuel is stored. Member utilities also sign separate Customer Agreements to ensure that these same restrictions apply.

The Service Agreements will provide assurance for the continued payment of these costs by requiring the customers to provide annual financial information, meet

creditworthiness requirements, and, if necessary, provide additional financial assurances (such as an advance payment, irrevocable letter of credit, third-party guarantee, or a payment and performance bond).

1.7 DECOMMISSIONING FUNDING ASSURANCE

The PFSF will be operated under a "start clean, stay clean" philosophy, with contractual obligations in the Service Agreement with each customer and PFSF administrative procedures to assure that no radioactive contamination is introduced into the facility. Thus the intention is to maintain the PFSF 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 method of funding decommissioning activities consists of two components: storage cask decommissioning and decommissioning for the remainder of the facility. The costs for decommissioning each storage cask is estimated at \$17,000. This amount will be prepaid into an externalized escrow account under the Service Agreement with each customer, 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. As storage cask decommissioning is completed, the amount of funds in the escrow account will be adjusted periodically to reflect the remaining decommissioning efforts. This method of funding complies with the requirements of 10 CFR 72.30(c)(1).

The costs of decommissioning the remainder of the facility and site is estimated to be \$1,631,000, which will be funded through a letter of credit coupled with an external sinking fund. 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. As the actual costs of decontamination and decommissioning are paid into the external sinking fund, the letter of credit will be reduced by an equivalent amount. This funding method complies with the requirements of 10 CFR 72.30(c)(3).

The per-canister fee and the amounts of the escrow account, external sinking fund and letter of credit will be reviewed and adjusted annually to account for inflation and any changes in the scope or cost of decommissioning. The escrow account, letter of credit and external sinking fund will be established in conformance with the guidance of NRC Regulatory Guide 3.66.

1.8 SITE LOCATION AND COMPLETION DATES

The proposed PFSF is located on the Skull Valley Indian Reservation which is within Tooele County, Utah, 27 miles west-southwest of Tooele City. The site is located 1.5 miles west of the Skull Valley Road. It is anticipated that the PFSF will be issued a specific license to receive, transfer and possess spent fuel in accordance with the requirements of 10 CFR 72 prior to June 2002 in order to commence operation of the PFSF. Construction of the PFSF is scheduled to start in September 2000, with completion by December 31, 2001. The construction and preoperational testing will be completed in time to support operation of the facility in 2002.

The construction start date of September 2000 is a schedule delay of nine months from that reported in the original License Application (dated June 20, 1997). This start date has been changed to be consistent with the NRC staff review schedule and issuance

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.

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

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

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.

CHAPTER 4

DECOMMISSIONING COST ESTIMATE

The decommissioning cost estimate is based on a 40,000 MTU facility. The size of the storage facility affects only approximately 6 percent of the overall decommissioning cost. The total decommissioning cost is highly contingent upon the shipping casks, the Canister Transfer Building, and the transfer casks, none of which are dependent on the size of the storage facility. The cost to decommission each storage cask is funded separately before an individual cask is utilized, as described in Section 5.1. The only variance in the decommissioning cost related to the size of the storage facility is the area of the concrete storage pads and the assumed amount of decontamination and disposal costs associated with that area.

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.

The cost to decontaminate each shipping cask is therefore estimated to be \$4,425, which is rounded to \$5,000, resulting in a total for 8 shipping casks of \$40,000.

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. Waste disposal cost of \$550 associated with decontamination of each Storage Cask is based on an estimate of 1.5 cubic feet of compacted low level waste at \$300/c.f. for disposal plus \$100 for transportation. 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. Core boring costs are estimated at \$850 based on two workers plus a health physics technician at \$25/hr each for 8 hours plus \$250 for miscellaneous tools and supplies.

If the steel liner is activated, it will be removed and sectioned for shipment off site to a licensed disposal facility. It will cost an estimated \$3,000 for dismantlement and

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 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. Using the same assumptions as for the shipping cask, the final decontamination and dismantlement of the transfer casks is estimated to cost \$5,000 per cask in labor and material disposal costs, for a total of \$20,000.

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. This cost is based on \$1/s.f. for general decontamination efforts plus an additional \$4/s.f. to perform a more intense cleaning of those areas with potentially higher contamination levels. These areas will require a reduction in cleaning rate per time unit and a corresponding increase in the unit cost. 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

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

account for any changes in the tasks, scope, cost or schedule for decommissioning. Additionally, the decommissioning cost estimate will be adjusted annually to account for the effects of inflation, utilizing the conservatively high Consumer Price Index, published by the Bureau of Labor Statistics. The amount of the Letter of Credit will be adjusted to account for any changes in the overall decommissioning costs and for deposits into the external sinking fund. 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 "stay 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 transfer cask internals (representative of removable contamination level) 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 the 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 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.

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.