8. BENEFITS AND COSTS OF THE PROPOSED ACTION

In addition to costs and benefits of the environmental impacts described in Chapters 4 through 6, this chapter summarizes other societal costs and benefits associated with the proposed action and its alternatives. Section 8.1 examines the economic costs and benefits of the proposed action. The presentation in Section 8.1 begins with a description of the model and assumptions used by PFS (see Section 8.1.1). The economic cost and benefit data as provided by PFS are then presented and supplemented with the interpretations of the NRC staff (see Section 8.1.2). Based upon these interpretations, Section 8.1.2 concludes with the presentation of the sensitivity analysis conducted by the NRC staff to evaluate the implications of using different numerical inputs than the ones used by PFS. Section 8.2 summarizes the environmental costs and benefits of the proposed action. Section 8.3 qualitatively summarizes other societal benefits of the proposed action.

8.1 Economic Benefits and Costs of Constructing and Operating the Proposed Facility

This section provides an analysis by the NRC staff of the economic benefits and costs of the applicant's (i.e. PFS's) proposal.[1] Benefits and costs are considered herein from a societal perspective, as opposed to the perspective of any particular individual or company.[2] The assessment in this FEIS considers only quantifiable benefits and costs. As discussed below, the benefits and costs analysis is based on the receipt of SNF at the proposed PFSF only during an initial 20-year license term. The NRC has performed analysis for a 40-year team (assuming a license renewal) and determined that the 20-year term analysis provides more conservative results because the costs per year of operation are higher.

The following analysis differs from that of the DEIS in order to reflect several changes in assumptions. Also, the applicant has updated its analysis in its ER in response to public comments on the DEIS and questions from the NRC staff in a request for additional information (RAI) (see PFS/RAI3 2000) and in light of information that has become available since the publication of the DEIS. The differences between the current analysis and the DEIS analysis result primarily from

1. revised estimates concerning at-reactor spent fuel pool storage capacity to reflect capacities reported to NRC by licensees;
2. changes in the membership of PFS and in the anticipated operational period for the Oyster Creek reactor, which was previously assumed to close prematurely in 2000 but is now expected to operate until its license expires in 2009;
3. moving the planned start of operation for the proposed PFSF from 2002 to the middle of 2003;
4. changes in the throughput and capacity aspects of the alternative scenarios presented in Sections 8.1.1 and 8.1.2; the storage **(but not receipt)** of SNF at the proposed PFSF after the 20-year license term is a possibility until decommissioning is completed; and

[1]The STB, BIA, and BLM have not taken part in the preparation of the benefits and cost analysis presented in this chapter.

[2]The NRC staff has conducted a separate evaluation of the safety aspects of the PFS application. The staff's evaluation on issues related to PFS's financial qualifications and decommissioning funding assurance is contained in the NRC's SER (see NRC/SER as updated). As set forth in the SER, the staff has concluded that PFS has provided reasonable assurance of its financial qualifications to construct, operate, and decommission the proposed PFSF.

5. the inclusion of a "break-even" analysis for the capacity and throughput of the proposed facility. "Capacity" is the amount of SNF that cold be stored at the proposed PFSF at any one time, while "throughput" is the amount that would be stored over the life of the facility.

PFS has estimated benefits and costs for several scenarios. The approach and assumptions used to develop these scenarios are reviewed below. The NRC staff agrees with PFS's approach, which considers the proposed project's benefits from a societal perspective. "Benefits" are estimated as the costs to society that can be avoided by use of the proposed PFSF. These "avoided costs" are estimated by subtracting the costs of storing SNF at the proposed PFSF from the costs of continuing to store SNF at reactor sites (until it can be sent to a permanent repository).

Scenarios are differentiated by (1) the grouping of reactor sites as sources of SNF to be stored at the proposed PFSF and (2) the date when a permanent repository is projected to become available. Scenarios evaluated by the NRC staff are based on alternative quantities of SNF that could be accepted at the proposed PFSF. PFS developed several cases: (1) a low usage case assuming the proposed PFSF accepted SNF only from PFS member companies (PFS assumed a facility capacity of 8,200 or 9,600 MTU with an SNF throughput of 13,856 MTU); (2) a second case, based on medium facility use (PFS assumed an SNF throughput of 27,000 MTU); and (3) a third case in which almost all of the maximum licensed storage capacity of 40,000 MTU is used (PFS assumed an SNF throughput of 38,000 MTU). For the second and third cases, projected PFSF capacities were based on PFS's estimates of reactors that would need additional at-reactor storage space and the age of the reactor sites. The staff has labeled these three scenarios as the "small throughput," "medium throughput," and "maximum throughput" scenarios, respectively. In using this terminology and in the following analysis, the staff makes no judgment about the comparative likelihood of these scenarios. The throughput are based on the storage requirements of the identified groups of reactor sites.

As a result of the NRC staff's evaluation of the applicant's financial qualifications as reflected in Chapter 17 of the NRC's SER, the NRC has proposed a license condition that would require PFS to have service agreements providing for long-term storage of SNF in excess of the 9,600 MTU capacity scenario (which bounds the small throughput scenarios). If an NRC license is issued, the small throughput scenario would be barred by this license condition. Therefore, only the second and third cases (i.e., the medium and maximum throughput scenarios) were included in the staff's evaluation in this FEIS. In lieu of the small throughput case, the results of a break-even analysis are presented below. The break-even analysis reflects PFS's determination of the smallest throughput scenario that would result in a favorable cost-benefit balance.

The medium and maximum throughput scenarios have each been evaluated under two different conditions based on when a permanent geologic repository begins accepting SNF—either 2010 or 2015. DOE considers the 2010 date to be the target date and the earliest availability of a permanent repository, while PFS's evaluation is based on the repository becoming available in 2015. The approach and assumptions used to calculate benefits and costs for the four scenarios is discussed below.

8.1.1 PFS's Model and Assumptions

The detailed basis for PFS's assumptions and calculations is described in *Utility At-Reactor Spent Fuel Storage Costs For The Private Fuel Storage Facility Cost-Benefit Analysis Revision 2,* ERI-2025-0001, April 2000. This report was generated by PFS's contractor, Energy Resources International (ERI), on April 28, 2000, in response to a staff request for additional information. A summary of that report is provided below.

8.1.1.1 Projection of Spent Fuel Generation and Additional Storage Requirements

ERI projected SNF generation and additional reactor site storage requirements on a reactor-by-reactor basis. Historical SNF discharges through December 1994 were taken from the DOE database RW-859. Projections for SNF generation and storage requirements after December 1994 were calculated through the end of the 40-year operating license terms for all currently operating reactors. The projections were made by an ERI computer model, SPNTFUEL. Assumptions used in these projections included average capacity factors of approximately 80 percent, with average discharge burn-up gradually increasing to 55,000 Megawatt-days (MWD)/MTU for PWRs and 45,000 MWD/MTU for BWRs. This results in a projection that the system-wide SNF generation would be approximately 85,000 MTU. ERI's SNF projections provide a year-by-year and reactor-by-reactor accounting of SNF generation.

Requirements for additional SNF storage for a particular reactor were calculated by ERI based on when a full core of fuel can no longer be discharged into the SNF storage pool. This is referred to as "loss of full core discharge capability." Information concerning each power reactor's maximum SNF storage capacity and/or licensed storage capacity can be obtained through various sources such as *Spent Fuel Storage Requirements 1994–2042*, U.S. Department of Energy, (DOE/RW-0431-Rev.1), June 1995. In effect, the projected SNF generation that occurs after loss of full core discharge capability determines the year-by-year additional storage requirements for each reactor site.

8.1.1.2 Spent Fuel Acceptance Assumptions

Additional storage requirements at a reactor site may or may not occur depending on the availability of SNF storage capacity at that site or elsewhere. Another factor that affects these requirements is when SNF can be shipped to a permanent repository. DOE has estimated that a permanent repository could begin accepting SNF from commercial power reactors in 2010. However, even after a permanent repository is complete and begins to accept SNF, the repository will be able to take only a limited amount of fuel in any given year. ERI assumed that DOE would accept the oldest fuel first (OFF) at the permanent repository. This assumption is used by ERI for all shipments bound for the repository. For SNF that could be shipped to the PFSF, ERI has assumed that fuel shipments will be scheduled in a manner that will (1) limit the amount of additional dry storage that must be added at reactor sites, and (2) reduce the time SNF remains at a reactor site following reactor shutdown for decommissioning. In order to model an SNF shipping schedule that would meet the needs of individual reactor licensees, an "optimized" spent fuel shipping schedule was developed for each of the PFSF scenarios with SNF received at PFSF during the 20 years of operation. Priority for shipments was provided to licensees whose reactors would require additional SNF storage capacity and to licensees of shutdown reactors to ensure that SNF which has cooled for a period no less than 5 years is removed from such sites on an expedited basis.

Combining the anticipated SNF generation with assumptions about the timing of when a permanent repository begins to accept SNF and the fuel acceptance priorities described above, the at-reactor inventory of SNF for each reactor for each year can be compared with the at-reactor storage capacity. In this way, the ERI spreadsheet model determines additional storage requirements for each reactor in a given scenario.

8.1.1.3 Estimating Costs

ERI calculates net benefits by finding the cost avoided by power reactor licensees due to operation of the proposed PFSF, and then subtracting the costs of building and operating the proposed PFSF. The ERI spreadsheet model first calculates the annual costs for a chosen group of reactors by applying cost assumptions to increments of additional storage requirements (as described above) for each reactor for each year until all SNF has been shipped off the reactor sites. For each scenario, the cost of a "no action" case (i.e., the case in which the proposed PFSF is not constructed) is calculated in order to establish the baseline cost for the group of reactors without the availability of the proposed PFSF. This cost is then compared to the total costs of the same group of reactors assuming that the proposed PFSF would be available. At-reactor SNF storage costs with the proposed PFSF also available will always be less than at-reactor costs in the no action case because these storage costs would be reduced by shipping fuel away from the reactor sites earlier than projected (e.g., 2010) for the no action alternative.

The availability of the proposed PFSF would allow reactor licensees to avoid costs in two ways. First, by having an off-site storage option available before a permanent repository is opened, costs could be avoided because the requirement for on-site storage would be reduced or eliminated. Second, after a reactor reaches the end of its operating life, all SNF could be shipped off-site earlier than if only a permanent repository were available to receive this SNF. Because SNF could be shipped from the reactors earlier if the proposed PFSF is constructed, the at-reactor storage requirements would be reduced and costs associated with building and operating additional at-reactor storage would therefore be avoided. Also, because all SNF could be shipped off-site earlier, the post-shutdown cost of continuing to operate the SNF pool could be reduced. Thus, the difference in annual costs generated by the no action case and the proposed PFSF case gives the avoided at-reactor costs (i.e., the benefits) of having the proposed PFSF available.

The final calculation for determining the net benefits or net costs of the proposed PFSF is to subtract the cost of the appropriate size and operation of the proposed PFSF from the avoided costs (benefits) that have been described above. This calculation results in the net benefits or net costs of the scenarios that have been calculated.

8.1.1.4 Discounting

All the costs (and benefits) for alternative scenarios are determined on an annual basis in constant 1999 dollars.[3] These values are then "discounted" to a present value so that they are comparable at a single point in time. Discounting reduces future values in order to reflect the time value of money. In other words, discounting recognizes that funds could potentially be used for other activities that could result in an increase in wealth. This means that benefits and costs have more value if they are experienced sooner. The higher the discount rate, the lower the corresponding present value of future cash flows.[4] The discount rate is an extremely important variable in this analysis because the proposed PFSF represents a near-term investment that reduces future costs.

When a discount rate is applied to values that are measured in constant year dollars, it is appropriate to use what is termed a "real" discount rate. A real discount rate is usually approximated by a return

[3]To convert "1999 dollars" to "2000 dollars," multiply "1999 dollars" by 1.02.

[4]For example: to an individual, $100 to be received in ten years is worth less than $100 now because it would take an investment of only $61.40 at a 5 percent annual interest rate to result in $100 in 10 years.

on capital minus the prevailing rate of inflation. Therefore a real discount rate should be fairly stable over time because it would not rise and fall with inflation trends.

PFS was requested by the NRC staff to calculate the present values using a 7 percent real discount rate. This rate is mandated by OMB Circular A-94 (Darman 1992) for public investment and regulatory analyses. The OMB rate is intended to approximate the marginal pre-tax rate of return on an average investment in the private sector in recent years.

PFS proposed a real discount rate of 3.8 percent based on a nominal rate for municipal bonds of 6-5/8 percent reported in the *Wall Street Journal* in October 1999 and an annual inflation rate of 2-3/4 percent (PFS/RAI2 1999). Thus the applicant's analysis assumes that all capital for PFS would be funded at interest rates represented by the rates available from municipal bonds. Later in this chapter, both of these rates (i.e., 7 percent and 3.8 percent) are used to calculate the present value of costs and benefits for the four scenarios.

8.1.1.5 PFS's Cost Assumptions

Table 8.1 presents PFS's cost assumptions for at-reactor storage. Dry storage involves the capital cost to construct an at-reactor ISFSI, as well as the incremental costs to process the SNF from pool to dry storage. It is assumed that licensees of each site at which dry storage is implemented would incur an up-front dry storage system capital cost. For those reactor sites that cannot accommodate large rail transportation casks, SNF is assumed to be transferred from the fuel pool to a smaller cask and then transferred using a dry cask transfer system from the smaller cask to the larger rail transportation cask. In this case, an additional capital cost would be incurred for the dry transfer system.

Table 8.1. PFS's at-reactor storage cost assumptions (1999 dollars)

Cost component	1994–2000 storage only systems	2001+ dual-purpose canister systems
Costs of dry storage capacity[a]		
Upfront dry storage[b]:	$9,184,000	$9,184,000
Dry transfer capital[c]	$8,084,620	$8,084,620
Incremental[d] 125T BWR/PWR ($/MTU)	$77,661	$93,737
Incremental[d] 75T BWR/PWR ($/MTU)	$143,516	$152,596
Incremental Truck[d] BWR/PWR ($/MTU)	$117,576	$115,780
Annual operating, maintenance[e]	$600,000	$600,000
Annual operating cost for post-shutdown storage operation ($/year per site)[f]	$8,000,000	$8,000,000

[a]A common cost for both PWR and BWR reactor types was used by PFS and was based on PFS's analysis of current market costs for SNF canisters.

[b]Up-front costs include construction, licensing, equipment, design and engineering, and startup testing.

[c]Dry transfer system costs are only included for sites unable to handle large SNF storage and transport systems.

[d]Incremental costs include overpacks, canisters, loading and unloading costs, consumables, and dry storage facility decommissioning costs.

[e]Annual operating costs for dry storage at operating reactors include personnel costs to administer and manage the reactor's on-site dry storage projects, incidentals such as electricity, lighting and security, and NRC annual license fees.

[f]Annual operating costs for post-shutdown operation of SNF storage (pool and/or on-site dry storage) includes costs for security, maintenance and engineering, insurance, license fees, taxes, etc.

The incremental costs shown in Table 8.1 represent the cost of canisters, storage overpacks, consumables, incremental storage pad costs, loading and unloading, and decommissioning of the storage facility. As provided in Table 8.1, storage-only system costs are applied to nuclear power reactor sites at which licensees have moved SNF to dry storage on-site prior to 2001. For dry storage after 2000, it is assumed that licensees would use dual-purpose canisters (i.e., a canister used for both transportation and storage).

In addition to the facility capital and processing costs, PFS assumes that an annual operating and maintenance cost of $600,000 would be incurred for support of the dry storage facility while the plant is operating. After shutdown, it is assumed that each reactor licensee would carry all overhead support costs (e.g., security, engineering, administration) and would therefore incur an annual operating and maintenance cost of $8 million until all fuel is removed from the site. PFS also included the loading and transportation costs for SNF that is assumed to be shipped to either the proposed PFSF or a permanent repository.

The projected cost for using the proposed PFSF has been estimated by PFS for each of the scenarios in Table 8.2. The costs include the cost of picking up the SNF at the reactor site, supplying the packaging for transporting it, and the costs for transporting the SNF to the Skull Valley storage site. These costs include the canisters and overpacks as well as the capital, operating and decommissioning costs for constructing and operating the proposed PFSF and the proposed rail line. The cost assumptions are included in PFS's business plan (which is proprietary). The staff has reviewed some of the key cost assumptions in the business plan and noted that the assumed costs for canisters and overpacks utilized by the proposed PFSF are 30 percent lower than what was assumed for the canisters and overpacks used for at-reactor storage. PFS justifies this difference on the basis that it expects to obtain lower costs due to the large number of containers to be purchased for the proposed PFSF operations. This assumption has been accepted by the staff as reasonable.

8.1.2 Results

Table 8.2 provides the PFS cost estimates using a 3.8 percent and 7 percent discount rate for the four scenarios discussed in Section 8.1. The maximum amount of SNF that PFS could accept at the proposed PFSF over the term of the license is 40,000 MTU (44,000 tons) of SNF. Once PFS has accepted 40,000 MTU of SNF, it may not accept any additional SNF shipments, even if it has begun to ship SNF off site (e.g., to a permanent repository).

The NRC license would not allow PFS to accept more than 40,000 MTU of SNF over the life of the license unless a license amendment is requested and approved. If the as-constructed physical storage capacity was less than 40,000 MTU, the applicant could accept more SNF over the life of the proposed PFSF (up to the 40,000 MTU limit) than could be stored at the facility at one time. For scenarios in which the total amount of SNF received by PFS is less than 40,000 MTU, it was assumed that PFS may continue to receive SNF after it has begun shipping SNF canisters from its site to a permanent repository. For instance, Scenario I in Table 8.2 indicates that the proposed PFSF with a maximum storage capacity of 21,000 MTU has a SNF throughput of 27,000 MTU.

Table 8.2 shows that the net economic benefits of the proposed PFSF are very sensitive to the discount rate, the size of the proposed PFSF, and whether the permanent repository opens in 2010 or 2015. The next section examines these alternative assumptions and presents sensitivity analyses for other key assumptions.

Table 8.2. Costs and benefits for alternative scenarios presented by PFS
(present value in millions of 1999 dollars)

	Discount rate 3.8 percent	Discount rate 7 percent
Scenario I—medium throughput (21,000 MTU capacity; throughput = 27,000 MTU; 2015 repository)		
Storage costs without PFSF	$4,504	$3,021
Storage costs with PFSF	$2,504	$1,925
Avoided costs or benefits attributed to PFSF	$2,000	$1,096
Cost of PFSF facility	$1,160	$841
Net benefit of PFSF (as compared to the no action alternative)	$840	$255
Scenario II—medium throughput (19,400 MTU capacity; throughput = 27,000 MTU; 2010 repository)		
Storage costs without PFSF	$3,994	$2,804
Storage costs with PFSF	$2,430	$1,904
Avoided costs or benefits attributed to PFSF	$1,564	$900
Cost of PFSF facility	$1,160	$841
Net benefit of PFSF (as compared to the no action alternative)	$404	$60
Scenario III—maximum throughput (38,000 MTU capacity; throughput = 38,000 MTU; 2015 repository)		
Storage costs without PFSF	$7,902	$4,924
Storage costs with PFSF	$4,465	$2,999
Avoided costs or benefits attributed to PFSF	$3,437	$1,925
Cost of PFSF facility	$1,442	$1,004
Net benefit of PFSF (as compared to the no action alternative)	$1,995	$921
Scenario IV—maximum throughput (38,000 MTU capacity; throughput = 38,000 MTU; 2010 repository)		
Storage costs without PFSF	$6,849	$4,493
Storage costs with PFSF	$3,910	$2,842
Avoided costs or benefits attributed to PFSF	$2,939	$1,651
Cost of PFSF facility	$1,442	$1,004
Net benefit of PFSF (as compared to the no action alternative)	$1,497	$647

Source: Spreadsheets provided by PFS.

Table 8.3. Sensitivity of scenario net benefits to alternative assumptions at a 7 percent discount rate
(present value in millions of 1999 dollars)

Assumptions	PFS's baseline data with OMB discount rate	Lower post-shutdown costs	Higher post-shutdown costs	Lower dry storage costs	Higher dry storage costs	Lower PFS capital and operating costs	Higher PFS capital and operating costs
Annual cost of post shutdown pool storage	$8,000,000	$6,000,000	$10,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000
Dry storage costs[a]	PFS estimates	PFS estimates	PFS estimates	PFS −10%	PFS +10%	PFS estimates	PFS estimates
Cost of PFS facilities and operations[a]	PFS estimates	PFS estimates	PFS estimates	PFS estimates	PFS estimates	PFS −10%	PFS +10%
Scenario							
I: medium throughput (21,000 MTU capacity; throughput = 27,000 MTU; 2015 repository)	$255	$32	$478	$224[b]	$287[b]	$339[c]	$171[c]
II: medium throughput (19,400 MTU capacity; throughput = 27,000 MTU; 2010 repository)	$60	-$127	$246	$35[d]	$84[d]	$144[c]	-$24[c]
III: maximum throughput (38,000 MTU capacity; throughput = 38,000 MTU; 2015 repository)	$921	$658	$1,185	$829[e]	$1,013[e]	$1,022[f]	$821[f]
IV; maximum throughput (38,000 MTU capacity; throughput = 38,000 MTU; 2010 repository)	$647	$395	$900	$578[g]	$716[g]	$748[f]	$547[f]

[a]The entry "PFS estimates" indicates PFS's baseline assumption; "PFS − 10%" indicates a value 10% less than PFS's baseline assumption; "PFS + 10%" indicates a value 10 percent greater than PFS's baseline assumption. PFS's baseline values are given in the following footnotes.

The following footnotes provide the baseline values to which the 10 percent sensitivity variation is applied:

[b]Baseline dry storage costs for this case are $315 M.
[c]Baseline PFSF capital and operating costs for this case are $841 M
[d]Baseline dry storage costs for this case are $243 M.
[e]Baseline dry storage costs for this case are $918 M.
[f]Baseline PFSF capital and operating costs for this case are $1,004 M.
[g]Baseline dry storage costs for this case are $690 M.

8.1.2.1 Discussion of Key Assumptions and Sensitivity Analysis

Table 8.3 provides the results of a sensitivity analysis. The sensitivity analysis uses the 7 percent discount rate and varies several assumptions to determine how the net economic benefit might be affected.

8.1.2.2 The Effects of the National Repository's Opening Date

DOE projects that a permanent repository will open in 2010 at the earliest. However, PFS indicates that it is uncertain whether this date will be met. PFS's assumption in the Environmental Report (PFS/ER 2001) is that a permanent repository would open in 2015. To ensure a complete analysis, the NRC staff requested PFS to prepare analyses for both 2010 and 2015 dates. The staff believes these dates provide a reasonable "window" for the purposes of analysis, due to the sensitivity of the results to the repository opening date.

The effect of when a permanent repository opens can be seen in Table 8.3 by comparing the cases with the same throughput (in MTU) of SNF for the 2010 versus 2015 repository opening dates. For all scenarios, the 2015 repository opening date significantly improves the net economic benefits.

8.1.2.3 The Effects of Discounting

The discount rate is an important variable because many of the costs and benefits would occur far into the future. Even relatively small differences in the discount rate have a significant effect on the results. For instance, a 3.8 percent real discount rate as proposed by PFS would reduce the costs of operating an at-reactor SNF storage pool from $8 million (undiscounted) to $4.6 million (discounted at 3.8 percent) at 15 years, while a 7 percent real discount rate would reduce costs to $2.9 million. In general, a lower discount rate favors the economics of the proposed PFSF compared to a higher discount rate. This is evident in comparing the results of a 3.8 percent discount rate with the results for a 7 percent rate in Table 8.2. The staff has used a 7 percent real discount rate as the default rate in the sensitivity analysis in Table 8.3, because this rate is mandated by OMB Circular A-94 for public investment and regulatory analyses.

8.1.2.4 Annual Post-Shutdown Pool Storage Costs

The annual post-shutdown pool storage costs have been assumed by PFS to be $8 million. These costs are for storing SNF in pools until it can be shipped from the reactor site. PFS has assumed that this cost continues for at least 5 years after reactor shutdown, which is the minimum time PFS assumes the fuel will be stored at the reactor site before it is transported. This cost would continue beyond 10 years for the repository-only cases until the permanent repository could accept 100 percent of the reactor site's SNF. The staff notes one example of the effect of this cost in which post-shutdown costs continue for 11 years longer when the proposed PFSF is not available—from 2030 to 2040—and which results in nominal cost savings of $88 million for the "with PFSF" case. When discounted (at 7 percent), however, cost savings in this example are only $7.9 million. Discounted savings are significantly less than undiscounted savings because the savings occur from 30 to 40 years in the future. Nevertheless, as shown in Table 8.3, changing the annual post-shutdown costs by ±$2 million results in a ±88 percent change in the net benefits for the medium throughput scenario (2015 repository).

The staff notes that the estimates of post-shutdown costs for operating an SNF pool vary widely. A study prepared for the DOE by Pacific Northwest Laboratory (PNL 1991) found that annual SNF pool operation cost for a single-pool site with all reactors shut down would range from $2.3 million to $6.0 million (1989 dollars). When the expected value ($3.7 million) from the DOE study is adjusted to year 1999 dollars, the annual cost would be $4.7 million. A nuclear power industry critique (conducted by ERI on behalf of the Edison Electric Institute) of the PNL study indicated that these annual costs could range from $8 million to as high as $25 million (see PFS/RAI2 1999d). This critique indicates that a substantial part of the difference between the PNL estimate and the industry estimates results because "PNL began with a dedicated spent fuel storage facility and attempted to adjust for the nuclear power plant environment, whereas the utilities began with an operating nuclear power plant and adjusted for the changes due to cessation of power production" (PFS/RAI2 1999d). Because this is a very significant post-shutdown cost, some reactor licensees have considered transferring all SNF from the pool to an at-reactor ISFSI. Although this has not yet been done at any of the existing reactor sites that have been shut down, it could be a cost-effective option for some reactor sites, particularly if post-shutdown pool storage costs are much more than the $8 million assumed by PFS. If pool storage costs are less than $8 million, (for example, $6 million as assumed in the sensitivity analysis), the economic benefit of the PFSF decreases significantly.

8.1.2.5 On-Site Costs for Additional Spent Fuel Storage

PFS has used assumptions for the cost of at-reactor storage that are presented in Table 8.1 and explained in Section 8.1.1.5. These cost assumptions (excluding SNF pool costs) are based on a DOE report (TRW 1993) and have been adjusted for inflation to 1999 dollars in Table 8.3. The staff has varied these assumptions by ±10 percent to determine their effect on net benefits. Table 8.3 indicates that a ±10 percent change in costs affects the range of the net economic benefits from ±10 percent to ±41 percent depending on the throughput of the proposed PFSF.

8.1.2.6 Costs of the Proposed PFSF

The cost of the proposed PFSF has been based on assumptions in PFS's 1997 business plan. In Table 8.3 these costs have been varied by ±10 percent. Various factors could change PFS's cost of constructing and operating the proposed PFSF. Table 8.3 indicates that the net economic benefits are highly sensitive to a 10 percent change in these costs.

8.1.2.7 Quantity of Spent Fuel Accepted at the Proposed PFSF

The quantity of SNF accepted at the proposed PFSF is critical to the calculation of net economic benefits. This can be seen by comparing the scenarios for medium and maximum throughput for a repository opening in 2010. Net benefits increase as the quantity of SNF stored at PFSF increases, reflecting economies of scale associated with the proposed PFSF. However, average benefits per unit of SNF throughput would be less for reactors that do not need additional on-site storage capacity and for reactors that have later shut down dates. Such reactors would, therefore, be associated with reduced post-shutdown PFSF storage benefits; and the positive effect of economies of scale on net benefits would be moderated and may be overridden as more such reactors are added to the scenarios.

PFS has done an analysis that indicates that the breakeven cost-benefit throughput for the proposed PFSF, if a permanent repository opens in 2015, would be a throughput of about 15,500 MTU and a capacity of 10,000 MTU. For a permanent repository opening in 2010, the breakeven throughput for the proposed PFSF would be 18,000 MTU and a capacity of 8,200 MTU. The license condition to be

imposed on PFS to provide financial assurance of its safe operation is less than the 2015 breakeven throughput and is less than the 2010 breakeven throughput as calculated by PFS. Therefore, if PFS receives only the amount of SNF imposed by the license condition, it would appear, based on this analysis, that the proposed facility would not be economically cost beneficial from an overall industry perspective (i.e., the proposed PFSF would result in greater cost than the no action alternative) although individual reactor licensees may have different cost-benefit results. However, if the facility receives SNF in excess of the breakeven amounts stated above, then the facility would appear to be cost beneficial from an industry perspective. In addition to the SNF capacity, this analysis is sensitive to several key assumptions as discussed in earlier sections of this chapter. It should be noted that the purpose of the license condition is to assure that PFS has adequate resources to safely construct, operate, and decommission the facility; it is not intended to assure that PFS makes a profit or that the overall economic cost benefit ratio is positive.

8.1.3 Conclusion

From an economic perspective, the net benefit of the proposed PFSF is directly proportional to the quantity of SNF shipped to the facility. The scenarios evaluated by the staff indicate the potential for a net positive benefit past the break-even throughput volume of SNF. As the SNF throughput decreases, the economic benefit decreases. The net economic benefits of the proposed PFSF are sensitive to several factors that are inherently uncertain. An analysis of the sensitivity of the potential net economic benefits to critical cost assumptions indicates the possibility of considerable variation in outcome. Notwithstanding the sensitivity of the benefits to these factors, cases in which the proposed PFSF has a capacity of 10,000 MTU and a throughput of at least 15,500 MTU have a greater likelihood of positive net benefits.

8.2 Environmental Benefits and Costs

8.2.1 Socioeconomic Benefits of the Proposed Action

Under the proposed action, the Skull Valley Band would benefit from funds generated from the lease of their land and from employment opportunities associated with construction and operation of the proposed PFSF. Additional financial resources for the Skull Valley Band as a whole, as well as for individual members, would offer expanded opportunities for local social, educational and economic development. The State of Utah would benefit economically from increased tax payments resulting from the sale of goods and services associated with the PFSF. Tooele County and other parts of Utah would benefit economically from the monies spent buying and manufacturing items for use at the proposed facility. Tooele County would also benefit from payments received under an agreement with PFS.

If the proposed PFSF is not licensed, cessation of the power generating activities before operating license expiration could result at one or more nuclear power plants unless alternative storage capacity is developed. Early shutdown of those reactors would lead to the reduced availability of electric power or the need to obtain replacement power from other sources.

8.2.2 Environmental Costs of the Proposed Action

The environmental costs of the proposed action are directly related to the potential environmental impacts discussed extensively in Chapters 4, 5 and 6. The most important of these environmental

costs is the commitment of public and Tribal land in Skull Valley for the proposed PFSF and the new rail line. This land would be lost for other uses until such time as the PFSF and rail line are decommissioned.

Additional environmental costs would be associated with the increased use of Skull Valley Road by construction workers and operations workers at the proposed PFSF. Increased road use would add to existing traffic and would produce vehicle noise audible at some residences.

The existing scenic qualities of Skull Valley would be changed by the presence of an industrial facility (i.e., the proposed PFSF) and the new rail line. Impacts to these scenic qualities could not be mitigated completely until the facility and rail line were eventually decommissioned and removed.

The proposed action would expose members of the public along transportation routes and the residents of Skull Valley to a very small, incremental amount of radiation. As discussed in Section 5.7, the health impacts of these doses are considered to be small.

8.3 Other Societal Benefits and Costs

Construction of the proposed rail line to the facility would enhance the transportation infrastructure in Skull Valley. The proposed improvements to the transportation infrastructure could make economic development of the central and southern parts of the valley more attractive. Similarly, enhancements to electric and telephone service induced by the proposed PFSF could enhance the attractiveness of the valley for other development or economic activities.

The existence of the proposed PFSF would provide an alternative to at-reactor storage and thus would help to ensure that a nuclear power plant would not have to cease operations before expiration of its operating license because of a lack of SNF storage capacity.

Before a nuclear plant site at which reactor operation permanently ceased could become entirely available for other uses, the facility would need to be decommissioned (i.e., all radioactive materials would have to be removed to levels acceptable for unrestricted release of the site). As long as SNF remains in storage at the reactor, full-site decommissioning cannot be completed. The existence of the proposed PFSF could allow licensees of shut down reactors to be decommissioned sooner, resulting in a cost savings to the reactor licensees and allowing earlier use of the reactor sites for other purposes.

9. COMPARISON OF ALTERNATIVES

9.1 Introduction

The regulations implementing the National Environmental Policy Act state that all FEISs should identify the agency's preferred alternative [see 40 CFR 1502.14(e)]. Regulations governing the NRC's preparation of an EIS require that an FEIS include a final recommendation by the NRC staff in regard to the proposed action [see 10 CFR 51.71(e), 51.91(d)]. This recommendation is to be based upon the information and analysis described in NRC regulations specified in 10 CFR 51.71(e) and is reached after (a) considering the environmental effects of the proposed action and the effects of the reasonable alternatives, and (b) weighing the costs and benefits of the proposed action.

This chapter identifies the preferred alternative and provides the rationale used by the NRC staff, BIA, BLM, and STB in reaching their respective conclusions. For the purposes of this FEIS, the preferred alternative consists of the total set of activities proposed by PFS for the construction and operation of the proposed PFSF and its associated support facilities. That is, while this FEIS separately evaluates (1) different locations for the ISFSI on the Skull Valley Band Reservation and (2) local transportation options in Skull Valley, this section provides the perspective of potential impacts associated with the project as a whole.

9.2 Federal Actions Covered in this EIS

Four interrelated Federal actions are associated with the proposal by PFS to construct and operate an ISFSI in Skull Valley. These actions are discussed in the following sections. All of these Federal actions are administrative.

9.2.1 NRC Action

PFS has applied to the NRC for a license to receive, transfer, and possess SNF on the Reservation of the Skull Valley Band. As part of the licensing process for the proposed facility, NRC will complete an environmental review (including this FEIS) and a safety review. Upon completion of both reviews, and the conclusion of an evidentiary hearing process on the requested license (which is now in progress) the NRC will decide whether to grant or deny the PFS license request.

9.2.2 BIA Action

A conditional lease between PFS and the Skull Valley Band was executed on May 23, 1997. The Skull Valley Band cannot, under 25 USC Sections 177 and 415, convey an interest in Reservation land held in trust without approval of the United States. Therefore, BIA must review and either approve or disapprove the lease following the issuance of this FEIS, issuance of a license by NRC, incorporation into the lease of any mitigation measures identified in the ROD, and the conclusion of an administrative review process.

9.2.3 BLM Action

PFS has applied to BLM for separate rights-of-way to construct either an ITF near Timpie, Utah, or a rail line from Skunk Ridge along the base of the Cedar Mountains on the western side of Skull Valley. Therefore, BLM will either grant one of the two rights-of-way requested by PFS or will deny both rights-of-way. Approval of the rail line requires an amendment to the Pony Express RMP prior to granting the right-of-way. The requested actions would be taken or denied following the issuance of this FEIS, issuance of a license by NRC, approval of the lease by BIA, resolution of the planning restrictions imposed by Section 2815 of the Defense Appropriation Bill for 2000, and completion of administrative procedures.

9.2.4 STB Action

PFS has applied to STB for a license to construct and operate a new rail line along the base of the Cedar Mountains on the western side of Skull Valley. Therefore, STB will either grant or deny the license request with appropriate environmental mitigation. On December 13, 2000, STB provisionally granted PFS's application, subject to the issuance of the FEIS, issuance of a license by NRC, and approval of the lease by BIA.

9.3 Comparison of Potential Impacts

This FEIS evaluates the construction and operation of an ISFSI at one of two locations (i.e., Site A—PFS's proposed site—and an alternative Site B) on the Reservation. In addition, an alternative site in Wyoming is also evaluated for comparative purposes in this FEIS.

As a subset of the proposed action to construct and operate the facility at Site A, two transportation options are evaluated for moving SNF through Skull Valley to the proposed PFSF: (1) the construction and use of a new rail line and (2) the use of heavy-haul vehicles between a new ITF and the proposed PFSF.

The following alternatives are evaluated in Chapters 4, 5, 6, and 7 are summarized in this section:

- Alternative 1, the proposed action: Construction and operation of the proposed PFSF at Site A on the Reservation, construction and operation of a new rail siding at Skunk Ridge, and construction and operation of a new rail line connecting the Skunk Ridge siding with Site A.
- Alternative 2: Construction and operation of the proposed PFSF at Site B on the Reservation with the same Skunk Ridge rail siding and rail line described in Alternative 1 above.
- Alternative 3: Construction and operation of the proposed PFSF at Site A, construction and operation of a new ITF near Timpie, and use of heavy-haul vehicles to move SNF down Skull Valley Road.
- Alternative 4: Construction and operation of the proposed PFSF at Site B with the same ITF and SNF transport described in Alternative 3 above.
- Construction and operation of a SNF storage facility near Shoshoni, Wyoming.
- No action.

The no-action alternative would be to not build the proposed PFSF or any of the proposed transportation facilities in Skull Valley. Under the no-action alternative, none of the potential impacts

associated with the proposed action would occur in Skull Valley. The no-action alternative encompasses both the case of no additional SNF storage at reactor sites beyond their current capacity, and the case of increased storage of SNF by either construction of other new SNF storage facilities or expansion of existing SNF storage facilities. These facilities could be provided either at the existing nuclear power generating station or at another location (i.e., other than Skull Valley). Because the proposed PFSF and/or an ISFSI in Wyoming are representative of an away-from-reactor ISFSI, the impacts from any such away-from-reactor storage facility under the no-action alternative would likely be similar to those described below for the proposed action or the Wyoming alternative. The comparison in this section, therefore, focuses on new or expanded at-reactor ISFSIs under the no-action alternative.

Table 6.1 in Chapter 6 summarizes the significance levels of the impacts for each of the alternatives identified above. Table 9.1 at the end of this chapter summarizes and compares the impacts of the alternatives as analyzed in detail in Chapters 4, 5, 6, and 7. For each potentially affected resource in Table 9.1, the magnitude, extent, or degree of the potential impact is compared among alternatives. Where the impacts do not differ substantially among alternatives, a statement is included in Table 9.1 to that effect.

The impacts described in Table 9.1, and the more detailed assessments in Chapters 4 through 7, were used by the NRC staff to reach the conclusions presented in Section 9.4 of this FEIS.

9.4 Conclusions of the Cooperating Agencies

9.4.1 Summary of Potential Impacts

9.4.1.1 The Proposed Action

Affected Area. The proposed PFSF site in Skull Valley would occupy undeveloped rangeland which has no unique habitats, no wetlands, and no surface water bodies or aquatic resources. There would thus be no impacts to these types of resources. The nearest resident is about 3.2 km (2 miles) away to the east-southeast. Approximately 94 ha (232 acres) on the Reservation would be cleared for the proposed PFSF and its access road. Of this cleared land, 57 ha (140 acres) would remain cleared for the life of the project. The remainder of the initially cleared land would be revegetated.

The proposed new rail line in Skull Valley would cross undeveloped public rangeland administered by the BLM. Approximately 314 ha (776 acres) would be initially cleared for the new rail line's right-of-way and 63 ha (155 acres) would be cleared for the life of the project (i.e., the remainder of the initially cleared land would be revegetated). No unique habitats exist in this area. The rail route would cross 32 arroyos (i.e., gullies or gulches cut by streams with ephemeral flows) at which culverts would be installed to maintain existing drainages. Grade crossings would be provided along the rail route at the intersections of existing unimproved roads and off-road vehicle paths.

Geology, Minerals, and Soils. Construction of the storage pad area of the proposed PFSF would disturb the existing soil profile. Topsoil removed from the site would be used in the construction of flood protection berms and would be available for reclamation of the lease site upon termination of the facility's license. Soils used in the soil-cement mat surrounding the concrete storage pads would be permanently lost, but this accounts for a very small percentage of similar soil in Skull Valley.

Large quantities of economic geologic resources (e.g., aggregate, railbed ballast) would be required during construction of the proposed PFSF and the rail line from Skunk Ridge. The locally available quantities of these materials appear to be adequate to supply the anticipated need. No more than 60 percent of the material for any individual resource that is available locally from five privately owned commercial sources would be needed for construction of the proposed PFSF and rail line. Since additional sources, including publically owned sand and gravel pits managed by BLM, are located within the region, the lost resource impact would be small. Mineral resources located beneath the proposed PFSF site and along the rail corridor would be unavailable for exploitation during the life of the project, however, the mineral resources at these locations are not unique and similar resources are widely available in the region.

Water Resources. Large quantities of water (e.g., for dust control, soil compaction, and concrete cask manufacture) would be required for construction and operation of the proposed PFSF and the rail line. Water for construction at the proposed PFSF would be supplied by new on-site wells and by tanker truck from off-site suppliers. If the new on-site wells were to prove inadequate with respect to water quality or quantity, then additional wells may be drilled in other parts of the Reservation after additional NEPA review by BIA, if necessary. The impacts of withdrawing groundwater are expected to be small given the volume of water that would be withdrawn and the location of the other nearby wells; however, until test wells are drilled and their production capacity is checked, certainty of the impact is unknown. The mitigation measures the Cooperating Agencies propose be required with respect to groundwater withdrawal are set forth below in Section 9.4.2. Water would be provided to the rail line construction sites in tanker trucks by a local vendor. PFS has contacted commercial contractors in the area and has received assurance that the required volumes of water are readily available and would not disrupt other users of water in the area.

The proposed PFSF design includes earthen berms to redirect floodwaters around the storage pads and related facilities. The access road and rail line would cross channels that carry ephemeral run-off or drainage during wet seasons and that would also carry surface water flow during floods. All drainage features under access route embankments, including the access road and the rail line, are designed to carry floodwater volumes that would occur during the 100-year storm event. Some portions of the access road and rail line (but not safety-related structures such as the storage pads) could be inundated by as much as 1 m (3 ft) of floodwater during a flood of PMF severity. The presence of the PFSF and its access routes would not increase downstream flooding potential; however, for extreme flooding during construction, small to moderate impacts could result from soil erosion and sedimentation of surface water channels. Also, for extreme flooding during operation some temporary water ponding would likely occur upstream of the access road and railroad culverts within the floodways associated with surface water runoff channels; however, these impacts are expected to be small. The mitigation measures the Cooperating Agencies propose be required with respect to surface water are set forth below in Section 9.4.2.

Air Quality. The primary impact to air quality would be from dust emissions from construction areas at the Reservation site and the related transportation facilities. The temporary and localized effects of construction could produce occasional and localized moderate impacts on air quality in the immediate vicinity of the construction activity, and small impacts elsewhere. Air quality impacts of operation would be small. Fugitive dust emissions would be minimized by mechanical dust control measures, such as surface wetting. The mitigation measures the Cooperating Agencies propose be required with respect to air quality are set forth below in Section 9.4.2.

Ecological Resources. Impacts, as described in Table ES.2, could occur to ecological resources from the clearing and use of land in Skull Valley. However the impacts to both vegetation and wildlife would be small. A portion of the area cleared during construction of the proposed PFSF would be revegetated with crested wheatgrass. Planting crested wheatgrass would have little impact on vegetation because it is no more invasive than the non-native cheatgrass that already exists at the site, and crested wheatgrass is more fire resistant than cheatgrass. Areas along the proposed rail line would be revegetated with a seed mixture that consists primarily of native species. The establishment or seeding of crested wheatgrass or native plant species might reduce competition from non-native annual grasses and could reduce the consequences of periodic wildfires in Skull Valley. The mitigation measures the Cooperating Agencies propose be required with respect to establishment or seeding of plant species are set forth below in Section 9.4.2.

The rare Pohl's milkvetch, a BLM special-status plant species is known to inhabit a region about 3.7 km (2.3 miles) southeast of the center of the proposed storage pad area. Construction and operation of the proposed PFSF is not expected to impact the area where the Pohl's milkvetch is located. A field survey of the proposed PFSF site did not reveal the presence of the Pohl's milkvetch on site. PFS intends to survey the proposed site again prior to construction. Should the Pohl's milkvetch be found in areas that could be affected by construction and operation, mitigation measures have been identified to prevent inadvertent impacts, such as trampling, to this species. The mitigation measures the Cooperating Agencies propose be required with respect to the Pohl's milkvetch are set forth below in Section 9.4.2.

No significant impacts to wildlife would be expected to occur during construction or operation of the proposed PFSF or its associated new rail line. The presence of these new facilities in Skull Valley would not create significant obstacles to the normal movement patterns of wildlife. Radiological doses to wildlife at the boundary of the proposed storage area would be well within acceptable levels for human exposure and would not be expected to create adverse impacts. PFS has proposed monitoring and surveillance programs to prevent wildlife habitation within the storage area. The mitigation measures the Cooperating Agencies propose be required with respect to wildlife monitoring and surveillance of the storage area are set forth below in Section 9.4.2.

Socioeconomic and Community Resources. Any impacts to socioeconomic and community resources should be readily absorbed by existing services and infrastructure in the region. The notable exceptions would be (a) potential temporary impacts to local traffic resulting from construction of the proposed PFSF and (b) disruption to and reduced availability of resources on two BLM grazing allotments. The impacts to Skull Valley Road may involve a 138-percent increase in daily use during the first phase of construction of the proposed PFSF. The Cooperating Agencies recommend that consideration be given to avoiding or minimizing such impacts by appropriately scheduling the proposed PFSF-related traffic. The impacts to grazing resources would result from the proposed rail route cutting through pasture and allotment division fences that separate grazing herds and separate some grazing areas from livestock watering sources. Mitigation measures could be those such as the installation of appropriate cattle guards and gates, as well as to providing new water sources, to ensure that livestock watering sources are accessible on both sides of the rail routes. The mitigation measures the Cooperating Agencies propose be required with respect to grazing resources are set forth below in Section 9.4.2.

Beneficial effects of the proposed action on the local economic structure would result from the creation of approximately 255 jobs during the peak of construction and approximately 45 jobs during PFSF operation (see Table 2.1). Many of these jobs are likely to be filled by workers from Tooele

County or from other counties within commuting distance, as well as by local members of the Skull Valley Band. In addition to jobs, it is expected that construction and operation of the proposed facility would result in increased business for the Pony Express Convenience Store on the Reservation and for other businesses and suppliers in the area. Also, there would be a large benefit to the Skull Valley Band in the form of lease payments for the duration of the lease.

Additional beneficial impacts on the economic structure of the impact area during the operational life of the proposed PFSF include state sales tax payments, incentive payments to Tooele County, local payroll, and other local expenditures. Payments to Tooele County have been estimated to be $91.2 million over the life of the PFSF (based on a proposed agreement negotiated between PFS and the County) (PFS/RAI2 1999). Local payroll during operation of the proposed PFSF has been estimated to be $81 million (based on PFS's estimate of the number of positions and anticipated pay for each position, including benefits) (PFS/RAI2 1999). Other local expenditures, including operations support and utilities, have been estimated to be $79 million (based on PFS's estimate of the number of personnel involved, and utilities based on the number of buildings and the estimated utility load for these buildings) (PFS/RAI2 1999). In addition, steel liners for the storage casks would be fabricated in the Salt Lake City or Tooele County area over a period of approximately 21 years and shipped by truck to the site on the Reservation, where they would be filled with concrete from the batch plant; the average number of weekly shipments to the site would be four (or 200 per year). The construction of casks and canisters has been estimated to be worth $747 million (PFS/RAI2 1999). The direct and indirect benefits of cask and liner construction would accrue to whatever jurisdiction hosts their manufacture.

In addition to impacts to the local economic structure, operation of the proposed PFSF would result in off-Reservation sales tax payments to the State of Utah, estimated to be $53.5 million (based on PFS's review of the Utah tax structure) over the life of the proposed PFSF (PFS/RAI2 1999).

Cultural Resources. Based on the results of a thorough ethnograpic and historic literature review, an intensive field cultural resources survey of the proposed PFSF site, and consultation process as required by Section 106 of the National Historic Preservation Act; potential impacts to archaeological and historical resources from construction of the proposed PFSF are considered to be small. During the consultation process with the Skull Valley Band, other regional Federally Recognized Indian Tribes and other organizations, no traditional cultural properties have been identified within the project area. Construction of the new rail line along the western edge of Skull Valley would have small to moderate impacts. Some historic properties identified in the area of potential effect (APE) would be adversely affected. The most significant adverse effect would be destruction of a small portion of the Hastings Cutoff of the California Trail, which the proposed rail line crosses at approximately a right angle. The NRC and Cooperating Agencies have developed—in consultation with the designated Utah SHPO, PFS, the Advisory Council on Historic Preservation, and other consulting parties—a draft Memorandum of Agreement (Agreement) and treatment plan for the cultural resources that could be adversely affected. If the required BLM and STB approvals are granted, the treatment plan would be finalized prior to any construction or operation of the proposed rail line. The mitigation measures the Cooperating Agencies propose be required with respect to these cultural resources are set forth below in Section 9.4.2.

Indian Trust Assets. Indian trust assets are the land and the products of the land. The proposed lease to PFS would not result in significant environmental consequences to biotic or other resources that could not be mitigated. The lease would also be consistent with tribal economic goals for the development of this portion of the Skull Valley Indian Reservation. The proposed lease includes

provisions for decommissioning the proposed PFSF before the end of the lease term, and funding mechanisms to assure implementation of the decommissioning provisions of the lease.

This FEIS describes mitigation measures that would reduce adverse impacts to affected trust resources. Numerous mitigation measures are incorporated into the design and proposed operation of the PFSF. If any unexpected impacts to Indian cultural resources were discovered during construction, these activities would cease; and the BIA and the Skull Valley Band of Goshute Indians would be notified immediately to determine the appropriate steps to take regarding further protection of such resources. The mitigation measures the Cooperating Agencies propose be required with respect to the cultural resources are set forth below in Section 9.4.2.

Human Health. Radiological impacts from SNF stored in Skull Valley under any alternative would be small. Dose calculations indicate that a hypothetical individual located at the boundary of the facility for 2,000 hours each year would receive a dose not more than a small fraction of the normal background radiation dose in the United States. Doses to workers would be higher, but would be administratively controlled to levels below NRC's regulatory limits.

Radiological doses to the public along SNF transportation routes from reactor sites to Skull Valley would be small and controlled by regulatory restrictions placed upon the licensed shipping casks to be used. Doses to train crews and workers would be administratively controlled to acceptable regulatory levels. The risk of a severe transportation accident is small.

Use of the proposed PFSF site (i.e., Site A) would result in the least radiological impact from routine operation among all alternatives considered because the nearest resident [i.e., 3.2 km (2 miles) away] is located farther away than if the facility were located at the alternative Site B [i.e., 3.1 km (1.9 miles)] or in Wyoming [i.e., 1.4 km (0.85 mile)]. The radiation doses from transportation using the proposed rail line would be less than the doses from the use of the ITF and heavy-haul vehicles on Skull Valley Road.

Noise. Noise impacts would result from construction equipment and earthwork activities, as well as from additional traffic associated with construction. Construction-related noise levels at the nearest residences on the Reservation would be about the same as the outdoor background noise levels given by EPA for a "quiet suburban street." Construction noise at the proposed Skunk Ridge rail siding would be indistinguishable from the background traffic noise for vehicles traveling along the nearby Interstate 80. Therefore, any potential noise impacts from construction activity would be small. Noise impacts would also result from operation of the proposed PFSF, primarily from mobile sources associated with the delivery of the casks; however, the levels of these operational noises would be expected to produce only small impacts. Because of the remote location of the proposed rail line and the infrequent train traffic, noise impacts from operation of the rail line would also be expected to be small.

Scenic Qualities. Potentially adverse impacts to the scenic qualities of Skull Valley would occur because the proposed PFSF would be the only significant development in the largely undeveloped valley and scenic impacts therefore are judged to be moderate. The Skull Valley Band has the option of retaining any or all the buildings and other improvements once the radiological decommissioning is completed; otherwise, PFS would be willing to remove the facility and related infrastructure before the end of the lease period. PFS may be required to do so at the end of the lease period, at the discretion of the Skull Valley Band and the BIA. This would be an important measure for restoring the scenic qualities of Skull Valley.

Recreation. The proposed route and alignment of the rail line from Skunk Ridge passes within approximately 800 m (2,600 ft) of BLM lands found to contain wilderness characteristics; however, the rail route does not cross the existing Wilderness Study Area located in the northern portion of the Cedar Mountains.

Recreational uses of the land in Skull Valley are currently minimal but include such activities as driving off-road vehicles, bird watching, and hiking. Construction and operation of the proposed PFSF and rail line may create some delays or inconvenience to users wishing to access recreational resources in Skull Valley, particularly during periods when (1) access to these resources would be adversely affected by the movement of construction materials and workers on Skull Valley Road (i.e., during construction of the proposed PFSF) and (2) access to resources west of the proposed rail line would be affected (i.e., during rail line construction). Since access to recreational resources west of the proposed rail line is typically made by way of Skull Valley Road, these particular impacts would be additive. During the later phases of construction and during the operational period for the proposed PFSF, impacts to recreational resources and opportunities should be smaller (i.e., with less traffic along Skull Valley Road), although there may be some continuing difficulty in accessing resources west of the proposed rail line. Nevertheless, construction and operation of the proposed PFSF and rail line would result in small direct and indirect impacts to recreational resources and opportunities in Skull Valley.

Environmental Justice. Through the scoping process, affected members of the Skull Valley Band and neighboring Indian Tribes expressed their concerns with the project and identified how they perceived they might be affected by construction and operation of the proposed PFSF and Skunk Ridge rail line. These discussions elicited a concern that adverse impacts to the portion of the Reservation that would be used for the proposed PFSF, and nearby Tribal trust and BLM lands, could also affect the cultural values of the Skull Valley Band and other Native Americans. The potential impacts of concern included disturbance, destruction, or limitations of services from ecological and biological resources; alteration of land forms; and noise or visual impacts to sacred sites. For each area of concern, impacts were reviewed to determine if there would be any potentially adverse impacts to the surrounding population or to the cultural values of the Skull Valley Band from SNF transport, or PFSF construction, normal operations, or accident conditions. If any potentially adverse impacts were identified, a determination was made as to whether minority or low-income populations would be disproportionately affected. Disproportionate impacts are defined as impacts that may affect minority or low-income populations at levels appreciably greater than the effects on non-minority or non-low-income populations. The Cooperating Agencies conclude that no disproportionately high and adverse impacts from the proposed action would occur to the Skull Valley Band or to minority and low-income populations living near the proposed rail routes.

9.4.1.2 The Proposed Site (Site A) Versus the Alternative Site (Site B) in Skull Valley

In Table 9.1, Site A is part of Alternatives 1 and 3, and Site B is considered in Alternatives 2 and 4. There are three notable differences between Sites A and B on the Reservation: (1) Site B lies farther from existing rail services; hence, about 10 ha (24 acres) more land would be needed for construction of a new rail line in Skull Valley, (2) Site B lies slightly closer to the location of the resident nearest to the proposed PFSF, and (3) Site B is located closer to known populations of the rare Pohl's milkvetch (a plant species). The potential for impacts to occur to this species from trampling or damage from construction vehicles would be slightly greater if the PFSF were constructed at Site B than at Site A. Each of these differences would give rise to greater impacts at Site B than at Site A. Nevertheless, the respective impacts of the use of Site A and Site B are considered to be largely indistinguishable.

9.4.1.3 The ITF Transportation Option

In Table 9.1, the construction of the ITF is considered in Alternatives 3 and 4. Construction of an ITF near Timpie would involve 4.5 ha (11 acres) of previously disturbed land that lies between the existing Union Pacific Railroad and Interstate 80. The ITF would include three new rail sidings, a new access road for heavy-haul vehicles, and a building with a crane for transferring SNF shipping casks from railcars onto heavy-haul trailers. The impacts from constructing these facilities would be small.

Under the ITF alternative, PFS would use multi-axle heavy-haul vehicles that would distribute the vehicle's load over a large surface area. Special permits would be required from the state of Utah because of the size and weight of these heavy-haul vehicles; however, PFS has indicated that the existing Skull Valley Road is capable of handling the proposed heavy-haul vehicles without any road improvements or upgrades. There is, however, the potential for increased wear and maintenance requirements on Skull Valley Road due to heavy truck traffic.

The use of heavy-haul vehicles moving SNF would produce only a small increase in the daily use of Skull Valley Road (about four round trips per week); however, the temporary impacts to other traffic from these large, slow-moving heavy-haul vehicles might be difficult to mitigate.

Workers at the ITF would receive additional radiological doses (i.e., doses beyond what would accrue during the use of the proposed rail line from Skunk Ridge) during the transfer of SNF shipping casks from rail cars onto heavy-haul trailers. PFS currently proposes to use the same workers that handle SNF at the proposed PFSF to transfer SNF from railcars to heavy haul vehicles at the ITF. Based on current projections, (i.e., number of workers and dose estimates for work activities), the doses received by these workers could exceed the 5 rem occupational exposure limit in 10 CFR Part 20. PFS would be required to ensure that the occupational exposure limit is not exceeded; therefore, PFS would be required to take additional measures to reduce the individual doses to acceptable levels. Although these doses would be administratively controlled to comply with NRC regulatory limits, the lower doses associated with the Skunk Ridge rail line would be preferable to those resulting from the ITF alternative.

9.4.1.4 The Wyoming Alternate Site

Table 9.1 includes a comparison of the potential impacts of constructing and operating an SNF storage facility (and its associated transportation facilities) in Wyoming with the impacts of such a facility in Skull Valley, Utah. Because a detailed design for an ISFSI in Wyoming does not exist, and because the Wyoming site has not been studied in as great detail as the Skull Valley site, an exact one-to-one comparison of potential impacts is not possible for each resource category. The conclusions regarding the evaluation of the Skull Valley site versus the Wyoming site are therefore made from the perspective of determining whether the Wyoming site is obviously superior to construction and operation of the proposed PFSF the Skull Valley site.

With two exceptions, the potential impacts for an SNF storage facility at the site in Fremont County, Wyoming, would be similar to those for the proposed PFSF in Skull Valley. The exceptions include impacts associated with the local transportation options and impacts to the Skull Valley Band. Each of these exceptions is discussed below.

The Wyoming site would cause fewer impacts than the Skull Valley site in regard to land use, disturbance of wildlife habitat, and the required amounts of construction materials related to the

construction of a new rail access corridor. Because of the greater distance from existing rail service in Skull Valley, significantly larger amounts of land, which is public land administered by the BLM, would be needed for a new rail transportation corridor in Skull Valley than for the Wyoming alternative (which lies entirely on privately-owned land). The Wyoming site would require only about 1.6 km (1 mile) of new rail line, compared to 51 km (32 miles) in Skull Valley. Thus, a considerably larger amount of habitat associated with the rail line would be disturbed in Skull Valley than would be disturbed near the Wyoming site. The other impacts of constructing a new rail line in Skull Valley would also be absent for an SNF storage facility at the Wyoming site. These impacts include the use of railbed ballast and aggregate, as well as the increased road use of vehicles transporting these construction materials and impacts to cultural resources along the proposed rail corridor in Skull Valley.

If the proposed PFSF were not constructed on the Reservation, then its positive economic benefits would not accrue to the Skull Valley Band. The Skull Valley Band would be free to pursue other uses for its land, but would lose opportunities for employment, as well as the financial gain from the proposed lease revenue.

In regard to all other potentially affected resources, the Skull Valley site does not appear to be appreciably different from the Wyoming site. While the impacts of building the rail line in Skull Valley are greater than those for the rail construction at the Wyoming site, these impacts would not be large, when considering mitigation measures proposed to be required by the Cooperating Agencies as set forth below in Section 9.4.2. In addition, the location of the ISFSI in Wyoming would not produce the positive socioeconomic effects for the Skull Valley Band. Accordingly, the NRC staff concludes that the Wyoming site does not appear to be substantially environmentally preferable and obviously superior to the proposed site (i.e., Site A) in Skull Valley.

9.4.1.5 The No-Action Alternative

The no-action alternative would be to not build the proposed PFSF. The potential impacts of the proposed action would not occur under this alternative. While the no-action alternative would avoid the impacts to Skull Valley, it could lead to impacts at other locations. The two most likely no-action scenarios involve (1) the continued accumulation of SNF in existing at-reactor storage facilities and (2) construction of new or expanded at-reactor SNF storage facilities. In either scenario, SNF would continue to be stored at reactor sites until it is shipped to a DOE permanent geological repository.

If no additional SNF storage capacity is constructed, SNF would continue to accumulate at nuclear power plants where it is being generated. Most SNF is currently being stored in spent fuel pools that were built into reactor facilities. Some power reactor licensees have expanded the capacity of their pool storage to accommodate the accumulated SNF. Some have built at-reactor ISFSIs to store their SNF in dry casks using a technology similar to what is proposed for Skull Valley. It is also possible that some power reactor licensees, however, because of other constraints (e.g., insufficient land) or State laws, may not be able or may not choose to expand on-site storage. Therefore, such a licensee might have to terminate operations prior to the expiration of its reactor license if its available spent fuel storage capacity is filled.

The NRC has examined, in support of other agency actions, the environmental impacts of at-reactor ISFSIs. In support of its Waste Confidence Decision, the NRC examined the environmental impacts of the operation of ISFSIs built at operating nuclear power plant sites. The Commission made a generic determination that, if necessary, spent fuel generated in any reactor can be stored without significant environmental impacts for at least 30 years beyond the licensed term for operation of that reactor at

on-site or off-site ISFSIs (10 CFR 51.23; 49 Fed. Reg. 34688, Aug. 31, 1984). The NRC has reviewed the Waste Confidence decision twice since it was first issued [in 1990 (55 Fed. Reg. 38474, Sept. 18, 1990) and in 1999, (64 Fed. Reg. 68005, Dec. 6, 1999)], and in both cases, the Commission basically reaffirmed the findings of the original decision. On July 18, 1990, the NRC published a final rule on "Storage of Spent Nuclear Fuel in NRC-Approved Storage Casks at Nuclear Power Reactor Sites" (55 Fed. Reg. 29181–29190, July 18, 1990), and issued a general license for storage of SNF at reactor sites (10 CFR 72.210). The environmental impacts of SNF storage at reactor sites were also addressed in an environmental assessment and its accompanying "finding of no significant impact" (NRC 1989). The finding of no significant impact states that:

> [T]he Commission concludes that this proposed rulemaking, entitled "Storage of Spent Nuclear Fuel in NRC-Approved Storage Casks at Nuclear Power Reactor Sites" will not have a significant incremental effect on the quality of the human environment.

In addition, the NRC has issued eleven site specific licenses for at reactor ISFSIs located in various parts of the country. For all eleven ISFSIs, an environmental assessment was completed and a finding of no significant impact was reached. For the no action alternative with respect to the proposed PFSF, the staff assumes that at-reactor ISFSIs would be constructed at reactor sites where additional storage capacity is needed and where physical constraints, such as available land at the reactor site, do not preclude the construction or operation of an ISFSI. The staff also assumes that the design, construction, and operation of future ISFSIs would be similar to that of existing ISFSIs. While a detailed examination of each reactor site where an at-reactor ISFSI could be built has not been completed, the staff does not expect, based on the previous NRC studies discussed above, that the construction and operation of future at-reactor ISFSIs would result in significant environmental impacts.

If at-reactor ISFSIs are constructed, the positive economic benefits from tax revenues, local payroll, and other expenditures would not be available to the Skull Valley Band, but the Skull Valley Band would be free to pursue other uses for its land. However, in the aggregate there would be at least equivalent economic benefits from tax revenues, local payroll, and other expenditures (other than lease payments) to at-reactor communities. These benefits would stem from expenditures related to at-reactor IFSFIs and continued SNF storage in cooling pools.

Section 6.7 of this EIS describes the environmental effects of the no-action alternative and compares them to the proposed action. Table 9.1 summarizes that comparison in tabular form. In sum, all environmental effects of the no-action alternative would be small to moderate. Like the no-action alternative, the impacts of the proposed action would also be small for most resources. However, as discussed in the following paragraphs, in comparison to the no-action alternative the proposed action would have small to moderate adverse impacts on flooding, air quality (during construction of the rail line), transportation (on Skull Valley road during construction), land use (associated with the rail line), cultural resources (along the rail line), and the scenic qualities of Skull Valley. On the other hand, the no-action alternative would not provide the small to moderate benefits to the economic structure of Skull Valley, Tooele County or northern Utah, including benefits to the Skull Valley Band, that would occur under the proposed action.

The following types of impacts would be avoided by the no-action alternative. During construction of the PFSF or during the life of the rail line, severe flooding conditions in Skull Valley could cause erosion of disturbed soils and unvegetated embankments. Construction of the rail line in the vicinity of Interstate 80 could cause dispersal of fugitive dust that could affect people traveling on the interstate.

During construction of the proposed PFSF, congestion on Skull Valley Road could cause delays for others who use the road. While the land use effects of the proposed PFSF would be small, the rail line could have moderate effects for those who use the affected area for livestock grazing. Construction of the rail line would affect eight historic properties that are eligible for inclusion on the National Register. Construction and operation of the PFSF would change the scenic quality of the valley by introducing an industrial presence into a largely undeveloped landscape.

While the no-action alternative would have no impact on the economic structure of Skull Valley or Tooele County, the proposed action would have small to moderate beneficial effects. The facility and the rail line would employ about 255 people during the peak of construction. Band members would benefit from lease payments for use of the land on which the PFSF would be built. Local businesses, primarily in Tooele County, would benefit from selling the supplies purchased by the PFSF and its employees. In addition, Tooele County would benefit from payments from PFS and from taxes paid by PFS employees who live there.

9.4.2 Mitigation Measures

The impact analyses contained in Chapters 4 and 5 of this FEIS have identified various mitigation measures PFS has either committed to or could take to reduce the environmental impacts associated with the proposed action. This section identifies the mitigation measures discussed in Chapters 4 and 5 that the staffs of the NRC, BIA, BLM, and STB propose be required and included, as appropriate, as part of each agency's record of decision.

Environmental Condition 1. Best Management Practices

In addition to the Best Management Practices for construction identified in Table 2.7 of this FEIS, PFS shall employ the following Best Management Practices for construction and operation of the proposed PFSF and related local transportation facilities.

A. Minimize land area disturbances by disturbing the smallest practicable area of land near the ephemeral streams along the proposed rail line corridor.

B. Establish staging areas for construction equipment in areas that are not environmentally sensitive to control erosion and spills.

C. Control temporary noise from construction equipment through the use of work-hour controls, and the operation and maintenance of muffler systems on machinery.

D. Ensure that construction and operational activities will not lead to contamination of groundwater, through a spill response procedure that provides for an appropriate response to a spill of oil or fuel at the PFSF or related transportation facilities.

Environmental Condition 2. Ecological Resources

A. PFS has consulted with the FWS regarding threatened or endangered species that may be present in the project area. Prior to initiating construction, PFS shall complete biological surveys in the locations identified below for the presence of sensitive species that may be found at those locations. Such surveys will be based on the most current lists of sensitive and/or threatened or

endangered species maintained by appropriate government agencies. When the project construction schedule is determined, PFS shall consult with BIA, the Skull Valley Band, and BLM regarding the appropriate timing of the surveys. PFS shall include the following species (and any additional ones, if identified as sensitive) in the biological surveys

- Proposed PFSF site and the area within 0.8 km (0.5 mile) of the site
  - Loggerhead shrike
  - Burrowing owl
  - Skull Valley Pocket Gopher
  - Kit fox
  - Pohl's milkvetch
- Proposed rail line and the area within 30 m (100 ft) of rail line construction
  - Skull Valley pocket gopher
  - Kit fox
- Proposed rail line and the area within 0.8 km (0.5 mile) of the rail line corridor
  - Raptors (eagles, hawks, falcons, owls, loggerhead shrike)

B. If any of the surveys required in Condition 2.A identify the presence of a sensitive species, PFS shall immediately notify the appropriate Federal agency with management responsibility (BIA or BLM).

C. If PFS identifies any Federally-listed threatened or endangered species within the proposed PFSF site area during construction, PFS shall immediately cease construction activities and notify BIA. If PFS identifies any Federally listed threatened or endangered species, or any State of Utah or BLM sensitive species during construction of the transportation facilities related to the proposed PFSF, PFS shall immediately cease construction activities and notify BLM.

D. If any Federally listed threatened or endangered species are taken by construction or operation of the proposed PFSF or its related transportation facilities, PFS shall immediately notify the U.S. FWS, BIA, the Skull Valley Band, or BLM, as appropriate.

E. If any State or BLM listed threatened or endangered species are taken by construction or operation of the transportation facilities related to the proposed PFSF, PFS shall immediately notify BLM and the Utah State Department of Natural Resources.

F. PFS shall complete any necessary biological assessment activities to support NRC, BIA or BLM's consultation requirements under the Endangered Species Act of 1973, and any BLM consultation agreements with the State of Utah.

G. Prior to initiating operations, PFS shall consult with NRC, BIA and the Skull Valley Band to develop an adequate wildlife monitoring program to be implemented during operation of the proposed PFSF.

H. Prior to initiating construction, PFS shall consult with BIA and BLM to develop an adequate plan for restoring and revegetating areas affected by construction of the proposed PFSF and related rail transportation facilities. (Includes greenstrip seed mix specifications)

I. Prior to initiating construction, PFS shall consult with BIA and BLM to develop an adequate plan for monitoring and controlling exotic and noxious weeds during construction and operation of the proposed PFSF and the proposed rail line. The plan must also include an approved list of herbicides.

J. Prior to initiating construction, PFS shall consult with BIA and BLM to develop an adequate plan for fire prevention, suppression, and rehabilitation during construction and operation of the proposed PFSF and related rail facilities.

K. Prior to construction of the rail line, PFS shall consult with BLM to determine the appropriate design, number, and locations for rail crossings to allow fire suppression equipment to cross the rail line.

L. PFS shall consult with BLM to develop an adequate plan to minimize impacts to livestock grazing activities during construction and operation of the rail facilities.

M. PFS shall ensure power poles and lines on the proposed PFSF are constructed to either conform to the guidance in "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996," or more recent guidance as determined by BIA.

Environmental Condition 3. Cultural Resources

A. Before beginning construction of a rail line from Skunk Ridge to the Reservation, PFS shall implement all the mitigation measures required in the Memorandum of Agreement (MOA) developed through the Section 106 consultation process (stipulations of the Agreement include Items B through G, below).

B. If PFS identifies any previously unrecorded artifacts or other cultural resources during construction activities on land under the jurisdiction of BLM, PFS shall immediately cease construction in the immediate vicinity of the discovery, inform BLM of the identified resources, and arrange for evaluation of the resources by a qualified individual to be retained by PFS.

C. If PFS identifies any previously unrecorded artifacts or other cultural resources during construction activities on the Reservation, PFS shall immediately cease construction in the immediate vicinity of the discovery, inform BIA and the Skull Valley Band of the identified resources, and arrange for evaluation of the resources by a qualified individual to be retained by PFS with the consent of the tribe.

D. A qualified individual shall evaluate any resources identified during construction pursuant to Conditions 3.B and 3.C and shall recommend whether such resources are eligible for listing on the *National Register*.

E. If resources eligible for listing on the *National Register* are identified pursuant to Condition 3.D, PFS shall describe, in detail, their characteristics and take the appropriate mitigation measures determined through NHPA required consultation.

F. Upon providing a description of cultural resources required pursuant to Condition 3.E to BLM or upon a BLM determination that cultural resources identified during construction on lands under the jurisdiction of BLM are not eligible for listing under the NHPA, PFS may resume construction on such lands.

G. Upon providing to BIA a description of cultural resources required pursuant to Condition 3.E above or upon a BIA determination that cultural resources identified during construction on the Reservation are not eligible for on the *National Register*, PFS may resume construction on the Reservation.

Environmental Condition 4. Air Quality

To control fugitive dust during construction, PFS shall implement a dust control program to minimize the off-site movement of fugitive dust. The program shall include measures to minimize dust emissions from construction and earthmoving activities (for both the proposed PFSF site and the new transportation facilities), the concrete batching facility, material transfer points and stockpiles, and temporary or permanent flood protection berms.

Environmental Condition 5. Water Resources

A. PFS shall design all culverts and crossings of intermittent streams along the rail line to minimize the potential for ponding, erosion, and sedimentation by matching the existing topography.

B. Prior to initiating construction, PFS shall develop a monitoring program to allow a determination as to whether the wells nearest the proposed PFSF are adversely impacted from groundwater withdrawal associated with the construction and operation of the proposed PFSF.

C. PFS shall be responsible for clean-up of any spills or accidents at the proposed PFSF, as well as at the rail siding and along the right-of-way for the rail line. In the event of any such spills or accidents, all clean-up activities shall conform with the clean-up standards set forth in 10 CFR Part 20, 40 CFR 112.7, and applicable State of Utah or EPA requirements.

D. PFS shall develop a maintenance plan to ensure all culverts are clear of debris to avoid potential flooding and stream flow alteration.

Environmental Condition 6. Traffic

If PFS determines that continual use of the unimproved roads adjacent to the proposed rail line is necessary to transport either workers or materials, PFS shall consult with BLM to develop an adequate plan to minimize any degradation of the roads. BLM shall be contacted prior to any use of the unimproved roads that could lead to their degradation.

Environmental Condition 7. Construction Training

Prior to initiating construction, PFS shall identify and train on-site personnel responsible for ensuring that construction activities do not disturb sensitive ecological and cultural resources. PFS shall further ensure that all on-site construction workers are trained on potential sensitive ecological and cultural

resources that could occur at the construction sites. This training shall be conducted in coordination with appropriate ecological and cultural resource personnel.

Environmental Condition 8. Monitoring and Reporting

A. PFS shall provide quarterly reports on compliance with the required construction-related mitigation conditions to the NRC, BLM, BIA, the Skull Valley Band, and STB.

B. PFS shall certify compliance with all construction mitigation conditions to NRC, BLM, BIA, the Skull Valley Band, and STB (1) at the completion of the rail facility construction and before initiating rail operations and (2) at the completion of the site and access road construction and before initiating operations of the PFSF.

9.4.3 Recommendation of the Preferred Alternative

The environmental review staffs of the NRC, BIA, BLM, and STB have concluded that (1) measures required by Federal and State permitting authorities other than the Cooperating Agencies, and (2) mitigation measures that are proposed in this FEIS to be required would eliminate or ameliorate any potential adverse environmental impacts associated with the proposed action specified by PFS in its NRC license application, BLM right-of-way application(s), and STB rail line application. In addition, upon completion of the project and before termination of the NRC license and the BIA lease, the closure and decommissioning of the facility would make the project area available for other uses by the Skull Valley Band.

The NRC staff and the Cooperating Agencies have concluded that the overall benefits of the proposed PFSF outweigh the disadvantages and costs, based upon consideration of

- the need for an alternative to at-reactor SNF storage that provides a consolidated, and for some reactor licensees, economical storage capacity for SNF from U.S. power generating reactors;
- the minimal radiological impacts and risks from transporting, transferring, and storing the proposed quantities of SNF canisters and casks;
- the economic benefits that would accrue to the Skull Valley Band during the life of the project; and
- the absence of significant conflicts with existing resource management plans or land use plans within Skull Valley.

Furthermore, the construction and use of a new rail line from Skunk Ridge to the proposed PFSF would have advantages over the use of a new ITF near Timpie in combination with Skull Valley Road to transport SNF to the PFSF. The impacts to local traffic on Skull Valley Road due to the presence of slow moving heavy-haul vehicles would be difficult to mitigate, but would be avoided by use of the new rail line from Skunk Ridge. Also, additional doses would be incurred by workers transferring SNF shipping casks from railcars to heavy-haul vehicles at the ITF, which would be avoided if the Skunk Ridge rail option were used instead of the ITF option.

The preferred alternative of the NRC staff is the proposed action, which includes NRC's issuing a license to PFS to receive, transfer, and possess SNF at a location in the northwest corner (i.e., at Site A) of the Reservation, BLM's approving the right-of-way and land use plan amendment for the use of public lands administered by the BLM for a new rail line, and STB's licensing the construction and

operation of a new rail line to be routed along the western side of Skull Valley and connected with the existing Union Pacific Railroad at a new siding near Skunk Ridge, Utah.

If the NRC approves the license and BIA approves the lease, BLM's preferred alternative is the proposed action. However, prior to BLM issuing a ROD, there must be resolution of a planning restriction imposed by Section 2815 of the National Defense Authorization Act for Fiscal Year 2000. After this, BLM would issue its ROD, complete its plan amendment process for the Pony Express Resource Management Plan, and then issue a right-of-way for the Skunk Ridge rail siding and rail line. Absent such actions by the NRC and BIA, BLM would not grant either of PFS's right-of-way requests.

Based on the information and analysis performed, the STB environmental review staff's conclusion is that the proposed project, with implementation of the mitigation measures proposed in this FEIS, would not result in significant adverse impacts to the environment; therefore, its preferred alternative would be to recommend approval of the construction and operation of the proposed rail line.

The BIA did not express a preference for any particular alternative in the DEIS, pending its consideration of environmental impacts and mitigation measures identified in the FEIS and public comments on the DEIS. Based on its consideration of the impacts and mitigation measures identified in this FEIS, and its trust responsibility to the Skull Valley Band, the BIA preferred alternative is the proposed action. The proposed action, based on the analysis in this FEIS, would have no significant adverse impacts but would have significant economic benefits for the Skull Valley Band. In addition, Site A (the site named in the proposed lease) is the preferred site, based on this FEIS, rather than Site B. Even though impacts at both Sites A and B would be insignificant, Site A is slightly further away from residential areas on the Reservation and habitat for the rare Pohl's milkvetch.

Table 9.1. Summary and comparison of potential environmental impacts

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Geology, Minerals, and Soil					
SMALL. Impacts to soils and economic geologic resources could occur from construction and operation of the proposed PFSF and the rail line. A small percentage of the soils in the valley would be permanently lost in the soil/cement mixture. Excess soils would not be generated. Aggregate materials used for construction are readily available locally and would be recoverable in decommissioning. Underlying mineral resources would be unavailable during operation.	The impacts for this alternative are considered similar to those identified for the proposed action.	Less aggregate would be required for construction of the ITF than the new rail line. These materials are readily available locally and would be recoverable on decommissioning.	The impacts for this alternative are considered similar to those identified for Alternative 3.	Like the preferred site (Site A) impacts to soils and economic geologic resources will occur. Because a much shorter rail line is required, soils disturbance and geologic resource commitments would be less than at the preferred site. Impacts from the unavailability of mineral resources beneath the site is the same as for the preferred site.	Construction or expansion of at-reactor storage facilities would involve negligible commitments of land that is already under the control of the owner of the associated nuclear power plant.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Surface Water					
SMALL. Some modification of surface drainage patterns could occur; however, there would be no adverse effects during normal weather conditions.	The impacts for this alternative are considered similar to those identified for the proposed action.	Little modification of the existing surface drainage system would be required at the ITF. Surface water impacts would be less than for the proposed action.	The impacts for this alternative are considered similar to those identified for Alternative 3.	There would be less interaction of the site footprint and access routes with surface runoff channels at the Wyoming site as compared to the Skull Valley site.	Construction or expansion of at-reactor SNF storage facilities would occur on sites previously disturbed by the construction of the nuclear power station; hence, no impacts to water resources would be expected.
Flooding					
SMALL TO MODERATE. Severe flooding conditions, if they occur during construction of the proposed PFSF, could cause erosion of disturbed soil and unvegetated embankments and would create downstream siltation. Potential impacts to the rail line under severe flooding events would be similar to those described above for the proposed PFSF.	The impacts for this alternative are considered similar to those identified for the proposed action.	No flooding potential exists at the ITF site. Less possibility of flood-related effects on transportation facilities if the ITF is constructed instead of the rail line.	The impacts for this alternative are considered similar to those identified for Alternative 3.	Potentially smaller impacts from watershed-scale flooding than at the Skull Valley site.	Site-specific SERs address flooding concerns. Expanded storage or new storage facilities would be subjected to NRC safety reviews and regulations.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Water Use					
SMALL. Most water required for construction would be purchased from commercial suppliers. On-site groundwater use would involve small quantities during operation.	The impacts for this alternative are considered similar to those identified for the proposed action.	Avoidance of rail line construction would reduce water use by more than 13,000 m^3 (50 million gallons).	The impacts for this alternative are considered similar to those identified for Alternative 3.	Less water would be required for construction at the Wyoming site because of a much shorter rail access corridor than in Skull Valley.	Water requirements for reactor cooling and SNF pool storage operations would continue. Additional water requirements for the expansion or construction of new storage facilities are expected to be small.
Groundwater					
SMALL. Little to no potential for impacts to other groundwater users or to groundwater quality.	The impacts for this alternative are considered similar to those identified for the proposed action.	Impacts would be similar to those of the proposed action except that effects of accidental spills along rail line construction corridor would be eliminated.	The impacts for this alternative are considered similar to those identified for Alternative 3.	Residential wells are known to exist within 1 mile of the Wyoming site. Groundwater quantity may be affected.	Construction or expansion of at-reactor SNF storage facilities would occur on sites previously disturbed by the construction of the nuclear power station; hence, no impacts to water resources would be expected.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Air Quality					
SMALL TO MODERATE. Large amounts of fugitive dust from earth disturbance would occur during construction of the proposed PFSF, and of the rail line where it runs close to Interstate 80. Air quality impacts would be small for the proposed PFSF, and moderate (similar to a large road construction project) for the rail line construction near Interstate 80, where small effects might be experienced by large numbers of people. Air quality impacts during operation from up to two locomotives, vehicles, and a backup generator would be small.	The impacts for this alternative are considered similar to those identified for the proposed action.	The air quality impacts for the proposed PFSF would be the same as the proposed action; however, the ITF precludes the need to construct a rail line to the storage site. Air quality impacts of constructing a rail line near Interstate 80 would be eliminated. Air quality impacts of constructing an ITF would be less than for a rail line due to the much smaller area that would be disturbed.	The impacts for this alternative are considered similar to those identified for Alternative 3.	Impacts at the Wyoming site are likely to be greater than any at either of the Skull Valley sites due to the proximity of construction areas to the nearest residence and a population center.	Some local air-quality impacts would be likely near existing nuclear stations if at-reactor facilities need to be expanded; however, these impacts are expected to be small.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Terrestrial Ecology					
Vegetation. SMALL. Clearing of approximately 408 ha (1,008 acres) of land for construction of the proposed PFSF and associated rail line would result in loss of existing degraded desert shrub/saltbush vegetation dominated by non-native cheatgrass. About 71 percent of this area would be replanted with native species or crested wheatgrass.	The impacts to vegetation at Site B would be similar to those for Site A. An additional 10 ha (24 acres) of existing vegetation would be lost by construction of the rail corridor. This additional loss would not affect any unique or sensitive plants or plant communities.	The impacts to vegetation at Site A would be similar to those for the proposed action. The construction of the ITF at Timpie would result in clearing only 4.5 ha (11 acres) of disturbed vegetation. The total area cleared, 98.5 ha (243 acres), would be much less than for the proposed action.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The impacts to vegetation for a facility in Wyoming would be similar to those for a facility in Skull Valley. The amount of vegetation disturbed by clearing would be considerably less than for the proposed action because the rail line would be shorter.	Site-specific disturbance of existing plant communities may occur. Where storage could be expanded only within existing facilities, impacts to vegetation would be expected to be small. If new SNF storage facilities are constructed in the vicinity of existing reactor structures and minimal land disturbance is required, impacts on vegetation would be minimal.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Wildlife. SMALL. Construction of the proposed PFSF and rail line would disturb 408 ha (1,008 acres) of wildlife habitat, but 71 percent of this area would be re-planted to native species and crested wheatgrass which may provide improved habitat for some species. Fences around the proposed PFSF would be expected to alter movement patterns of larger animals, but such impacts should be small if BLM-recommended mitigation measures to provide crossings of the rail line are implemented. Operation of the proposed PFSF could result in radiation exposure to some species that might be in close proximity to the casks (e.g., birds and small animals); these exposures, however, would be below stated criteria.	The impacts to wildlife at Site B would be similar to those for Site A. An additional 10 ha (24 acres) of existing wildlife habitat would be lost by construction of the rail corridor. This additional loss would not affect any unique or sensitive habitat.	The impacts to wildlife at Site A would be similar to those for the proposed action. The construction of the ITF near Timpie would result in loss of only 4.5 ha (11 acres) of disturbed habitat. The impacts of the rail corridor on wildlife movement and habitat would not occur.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The impacts to wildlife for a facility in Wyoming would be similar to those for a facility in Skull Valley without an ITF. Wildlife species that are present on the Wyoming site are similar to those at Skull Valley and would be affected in similar ways. Considerably less wildlife habitat would be affected because of the shorter rail access corridor.	Site-specific disturbance of existing wildlife habitats may occur. Where storage could be expanded only within existing facilities, impacts to wildlife habitats are expected to be small. If new SNF storage facilities are constructed in the vicinity of existing reactor structures and minimal land disturbance is required, impacts on wildlife would be minimal.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Wetlands. SMALL. No impacts to wetlands from construction of the proposed PFSF are anticipated because there are no wetlands on or near the preferred site or in the vicinity of the rail line and siding. A potential small impact to wetlands around Horseshoe Springs could result from increased recreational use by temporary construction workers.	The impacts to wetlands would be similar to those of the proposed action because no wetlands are present in areas affected by the project.	The impacts to wetlands would be similar to those of the proposed action because no wetlands are present in areas affected by the project.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The impacts to wetlands for a facility in Wyoming would be similar to those for a facility in Skull Valley. One wetland is known to occur on the Wyoming site, but it could be avoided if the project were to be located there.	Site-specific disturbance of existing wetlands may occur. Where storage could be expanded only within existing facilities, impacts to wetlands are expected to be small. If new SNF storage facilities are constructed in the vicinity of existing reactor structures and minimal land disturbance is required, impacts on wetlands would be minimal.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Perennial and Ephemeral Streams. SMALL. No impacts to streams are expected to occur on the proposed PFSF site because there are no streams present. Because the proposed rail corridor would cross 32 streams with ephemeral flows, it is possible, depending on the time of year that construction occurs, that disturbed soils could create small short-term increases in the turbidity of any water in such streams. Such impacts are expected to be small.	The impacts to perennial and ephemeral streams would be similar to those of the proposed action because no additional streams are present on Site B or the additional area needed for the rail corridor.	The impacts to perennial and ephemeral streams would be much less than under the proposed action because there would be no crossings of the 32 ephemeral streams along the rail corridor. No streams would be affected by construction and operation of the ITF near Timpie.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The impacts to perennial and ephemeral streams for a facility in Wyoming would be similar to those for a facility in Skull Valley. Two ephemeral streams occur near the Wyoming site and two or three dry washes are within 1.6 km (1 mile) of the site.	Site-specific disturbance of existing streams may occur. Where storage could be expanded only within existing facilities, impacts to streams are expected to be small. If new SNF storage facilities are constructed in the vicinity of existing reactor structures and minimal land disturbance is required, impacts on perennial or ephemeral streams would be minimal.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Threatened, Endangered, and Species of Special Concern. SMALL. No Federally or State-listed threatened or endangered plant species are known to occur on the proposed PFSF site or rail line. Federally and State-listed raptors (e.g., ferruginous hawk) and the BLM-listed loggerhead shrike are potentially present in Skull Valley. The rare Pohl's milkvetch, a BLM special status plant species, is potentially present near the site. Habitat for the BLM-listed kit fox and burrowing owl is present along the Skunk Ridge rail line and on the proposed PFSF site.	The impacts to threatened and endangered species and State species of concern for a facility located at Site B would be similar to those for a facility at Site A, although an additional 10 ha (24 acres) of potential habitat for such species would be disturbed.	The impacts to threatened and endangered species and State species of concern would be similar to those of the proposed action, except that less habitat for species potentially present in the area would be disturbed.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The impacts to threatened and endangered species and State species of concern for a facility in Wyoming would be similar to those for a facility in Skull Valley. Owl Creek miner's candle, a plant species which has a declining population occurs in the general area of the site, and the ferruginous hawk, a State-listed species in Wyoming, is reported to use the site.	Site-specific disturbance of existing plant and/or wildlife habitats may occur. Where storage could be expanded only within existing facilities, impacts to threatened or endangered species are expected to be small. If new SNF storage facilities are constructed in the vicinity of existing reactor structures and minimal land disturbance is required, impacts on threatened or endangered species would be minimal.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
No impacts would occur to Federally listed threatened or endangered species. Impacts to State-listed species and other species of special concern would be small.					
Socioeconomics and Community Resources					
Population. SMALL. The total increase in population amounts to approximately 0.6 percent of Tooele County's 1996 population during construction and less than that during operations. Because only Skull Valley Band members and their spouses may live on the Skull Valley Reservation, impacts on Reservation population would be small.	The impacts for this alternative are considered similar to those identified for the proposed action.	The total increase in population amounts to approximately 0.4 percent of Tooele County's 1996 population. This is approximately two-thirds of the population increase associated with construction activities for the proposed action.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The Wyoming site is located in a remote, sparsely populated area, and the impacts to population of constructing and operating a facility at the Wyoming site are expected to be quantitatively similar to those at the remote Skull Valley site. Unlike Skull Valley, the Wyoming site is located on private land. Its development is expected to have no special impact on either the population or infrastructure of the Wind River Indian Reservation.	The potential effects on population would depend on the site and the type of expansion required. The impacts at any given nuclear plant would be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored. In addition, the State of Utah and Tooele County would not receive tax and other economic benefits associated with Options 1-4.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Housing. SMALL. The total increase in housing requirements amounts to approximately 26 percent of vacant housing units for sale or rent in 1990 for Tooele County during construction and approximately one-half that proportion during operations. Because only Skull Valley Band members and their spouses may live on the Skull Valley Reservation, impacts on Reservation housing would be small.	The impacts for this alternative are considered similar to those identified for the proposed action.	The increase in housing requirements would be less for this alternative (i.e., approximately 17.2 percent of vacant housing units) than the proposed action because fewer workers would be needed during construction.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The Wyoming site is located in a remote, sparsely populated area, and the impacts to housing of constructing and operating a facility at the Wyoming site are expected to be quantitatively similar to those at the remote Skull Valley site. Unlike Skull Valley, the Wyoming site is located on private land. Its development is expected to have no special impact on either the population or infrastructure of the Wind River Indian Reservation.	The potential effects on housing would depend on the site and the type of expansion required. The impacts at any given nuclear plant would be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Education. SMALL. The total increase in school-age children amounts to approximately 0.5 percent of the enrollment in 1997 for Tooele County during construction and somewhat less than that during operations. Because only Skull Valley Band members and their spouses may live on the Skull Valley Reservation, impacts on Reservation education would be small.	The impacts for this alternative are considered similar to those identified for the proposed action.	The increase in school-age children would be less for this alternative (i.e., approximately 0.3 percent of existing enrollment) than the proposed action because fewer workers would be needed during construction.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The Wyoming site is located in a remote, sparsely populated area, and the impacts to education of constructing and operating a facility at the Wyoming site are expected to be quantitatively similar to those at the remote Skull Valley site. Unlike Skull Valley, the Wyoming site is located on private land. Its development is expected to have no special impact on either the population or infrastructure of the Wind River Indian Reservation.	The potential effects on education would depend on the site and the type of expansion required. The impacts at any given nuclear plant would be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Utilities. SMALL There may be some improvement to electrical service if upgrades are required for the proposed PFSF. The small number of in-moving workers would likely live in existing housing during construction and operations that would not require additional utility hookups. Because only Skull Valley Band members and their spouses may live on the Skull Valley Reservation, impacts on Reservation utilities would be small.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The Wyoming site is located in a remote, sparsely populated area, and the impacts to utilities of constructing and operating a facility at the Wyoming site are expected to be similar to those at the remote Skull Valley site. Unlike Skull Valley, the Wyoming site is located on private land. Its development is expected to have no special impact on either the population or infrastructure of the Wind River Indian Reservation.	The potential effects on utilities would depend on the site and the type of expansion required. The impacts at any given nuclear plant would be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Solid and Sanitary Waste. SMALL. The actual quantities of solid wastes expected to be generated are small during both construction and operation of the proposed PFSF and would be shipped to licensed landfills or to permitted low-level waste facilities, as appropriate. Spoils resulting from construction of the proposed PFSF and the proposed rail line would be reapplied for grading purposes, and vegetative wastes along the proposed rail line would be shredded and scattered in place. Because only Skull Valley Band members and their spouses may live on the Skull Valley Reservation, impacts on Reservation solid and sanitary waste would be small.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The Wyoming site is located in a remote, sparsely populated area, and the impacts to solid wastes of constructing and operating a facility at the Wyoming site are expected to be similar to those at the remote Skull Valley site. Unlike Skull Valley, the Wyoming site is located on private land. Its development is expected to have no special impact on either the population or infrastructure of the Wind River Indian Reservation.	The potential effects on solid wastes would depend on the site and the type of expansion required. The impacts at any given nuclear plant would be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Transportation and Traffic. SMALL TO MODERATE. The period of greatest traffic impact would occur during the first 6–8 weeks of constructing the proposed PFSF, with a 130-percent temporary increase in the use of Skull Valley Road for the movement of construction materials and workers resulting in delays along it. Impacts resulting from construction of the proposed rail siding and rail line would be minimal (accounting for only a 4.5 percent increase in traffic along Interstate 80) and would be spatially separate from impacts along Skull Valley Road. Impacts during operation of the proposed PFSF and use of the rail line for the movement of SNF would be substantially less than during construction.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts would generally be of similar magnitude and significance as those for the proposed action. The contribution to adverse transportation impacts resulting from construction of the ITF would be minimal (accounting for only a 1.2 percent increase in traffic along Interstate 80), in addition to traffic delays during construction of the proposed PFSF (identical to those for the proposed action). There would be some additional delays along Skull Valley Road during the operation of the proposed PFSF particularly related to movement of 2–4 SNF shipments per week to the proposed facility. There is the potential for increased wear and maintenance requirements on Skull Valley Road due to heavy truck traffic.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The Wyoming site is located in a remote, sparsely populated area. The impacts to transportation of constructing and operating a facility at the Wyoming site are expected to be less than those at the remote Skull Valley site because of the Wyoming site's closer proximity to the railroad mainline.	The potential effects on transportation would depend on the site and the type of expansion required. The impacts at any given nuclear plant would be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Economic Structure. SMALL TO MODERATE (but beneficial). Constructing the proposed PFSF and the proposed rail line would directly result in the creation of approximately 255 jobs during the peak of construction and approximately 43 jobs during operation. Construction and operation of the proposed PFSF would result in increased business for the Pony Express Convenience Store on the Reservation and for other businesses and suppliers in the area. There should be a large benefit to the Skull Valley Band in the form of lease payments for the duration of the proposed PFSF's operation.	The impacts for this alternative are considered similar to those identified for the proposed action.	Approximately two-thirds as many jobs would be created during the peak of construction as compared to the proposed action. Other impacts to economic structure (e.g., purchases and lease payments to the Skull Valley Band) are equivalent to those for the proposed action.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The Wyoming site is located in a remote, sparsely populated area, and the impacts to economic structure of constructing and operating a facility at the Wyoming site are expected to be similar to the economic impacts at the remote Skull Valley site, except for those on the Skull Valley Band. Because this site is not on tribal trust land, the local Native American community would not benefit from lease payments, although members might benefit from employment because of the facility.	The potential effects on economic structure would depend on the site and the type of expansion required. The impacts at any given nuclear plant would be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored. In addition the Skull Valley Band would not benefit from lease payments. The aggregate economic benefits to local communities resulting from the no action alternative are likely to be similar to those for the proposed action, although there would be no lease payments comparable to those received by the Skull Valley Band under Alternatives 1-4.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Economic benefits of the proposed action include State sales tax payments, local payroll, incentive payments to Tooele County, and other expenditures. Sales tax payments to the State of Utah are estimated to be $53.5 million, while incentive payments to Tooele County are estimated to be $91 million over the life of the project. Local payroll during operation of the proposed PFSF is estimated to be $81 million. Other local expenditures, including operations support and utilities, are estimated to be $70 million. The construction of steel liners for the storage casks could be accomplished locally or in Salt Lake City and could add an additional $747 million to anticipated local expenditures.				Economic benefits similar to those identified for a facility in Skull Valley would be expected to accrue to the state and local governments with jurisdiction over the Wyoming site.	The state of Utah and Tooele county would not receive the sales tax revenues and other economic benefits that would occur under Alternatives 1-4.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Land Use					
SMALL TO MODERATE. Impacts to land use for construction of the proposed PFSF would be expected to be quantitatively small (since a small proportion of the total land of the Reservation and an even smaller proportion of land within Skull Valley would be altered), even if the change would be qualitatively different. Construction of the proposed rail line could result in reduced availability of grazing resources, including access to livestock watering resources, during both construction and more particularly during operation.	The impacts for this alternative are considered similar to those identified for the proposed action.	This alternative would avoid adverse impacts to grazing activities in the area of the proposed rail corridor that would accompany the proposed action. Construction of the ITF would have minimal land use impacts since the site had been previously disturbed.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The Wyoming site is located in a remote, sparsely populated area. The impacts to land use of constructing and operating a facility at the Wyoming site are expected to be less than those at the remote Skull Valley site because of fewer land requirements for transporting SNF from the railroad mainline to a storage facility.	The potential effects on land use would depend on the site and the type of expansion required. The impacts at any given nuclear plant would be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Cultural Resources					
SMALL TO MODERATE. The Cooperating Federal Agencies have determined that activities associated with construction of the Skunk Ridge rail line would adversely affect parts of eight historic properties that have been evaluated as being eligible for inclusion on the *National Register.* Impacts to sections of these sites that lie within the rail right-of-way corridor will be mitigated prior to construction. During construction, temporary barricades will be constructed along the edge of the right-of-way at each historic property to prevent inadvertent	The impacts for this alternative are considered similar to those identified for the proposed action.	Construction of the facility at Site A, a new ITF at Timpie, and use of the Skull Valley Road for heavy haul transport will not directly impact any known archaeological, historical, or traditional resources, although it will alleviate the potential for impact to the Hastings Cutoff Trail segment on the west side of the valley and other cultural resource sites that have been identified in the vicinity of the rail corridor. Use of the Skull Valley Road without alteration will not impact known cultural resources that exist adjacent to the present roadway.	The impacts for this alternative are considered similar to those identified for Alternative 3.	Although equivalent archaeological, historic, and Native American cultural resource studies have not been conducted at the Wyoming Site, it is believed, based on the site file and literature reviews, that impacts to cultural resources would be similar to or less than those for a facility in Skull Valley. The fact that a lengthy rail access is not required generally reduces the potential for adverse impacts to cultural resources.	Construction or expansion of at-reactor storage facilities would likely involve areas at the respective site that are already disturbed. Therefore, there would be no anticipated impacts to archaeological or historic resources. Construction on previously undisturbed land already under control of the associated power station could require further cultural resource field studies.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
loss of integrity to the portions of the properties being preserved outside the rail corridor. Construction activities for the rail line are considered to have a moderate impact on cultural resources. Operation of the rail line would have a small impact. No traditional cultural properties important to Federally Recognized Indian Tribes or culturally important natural resources have been documented at the site, or along the proposed rail corridor; consequently, construction and operation of the proposed PFSF is considered to have a small potential for affecting such resources or cultural values.					

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Human Health (Excluding SNF Transportation Impacts)					
Non-Radiological Impacts to Workers. SMALL. Occupational accidents during construction and operation of the proposed PFSF and rail line would be expected to result in no fatal injuries and possibly 92 nonfatal injuries associated with lost workdays during the 40-year life of the proposed PFSF.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts to workers for this alternative would be similar to those from the proposed action. The construction and operation of an ITF instead of a rail line would result in a similar number of potential nonfatal injuries associated with lost workdays (i.e., 92) over the life of the proposed PFSF.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The impacts to workers for this alternative would be similar to those from the proposed action. The primary differences would be related to a shorter length of rail line being constructed in Wyoming.	There would be small, incremental occupational risks to workers during the construction and operation of new or expanded at-reactor storage facilities.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Radiological Doses to Members of the Public. SMALL. The estimated annual dose to a hypothetical individual at the boundary of the proposed PFSF would be no more than 0.0585 mSv (5.85 mrem). This is about 2 percent of the dose from natural background radiation in the United States and is well within the 0.25 mSv/yr (25 mrem/yr) limit established by NRC regulations. The dose to the nearest resident would be no more than 3.56×10^{-4} mSv/yr (0.036 mrem/yr).	The impacts to the public for this alternative would be similar to those from the proposed action. While the nearest existing resident is closer to Site B than to Site A, the doses at each site would be small and almost indistinguishable from one another.	The impacts to the public for this alternative would be similar to those from the proposed action.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The impacts to the public for this alternative would be similar to those from the proposed action. However, there is a larger population near the Wyoming site and the nearest residence is closer than in Skull Valley. The dose to the nearest resident would be about 0.02 mSv/yr (2 mrem/yr) which is well within NRC regulatory limits.	Because of the relatively large reactor sites, any incremental off-site doses due to direct radiation exposure from additional on-site SNF storage are expected to be small, and when combined with the contribution from reactor operations, will be well within NRC regulatory limits.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Radiological Doses to Workers. SMALL. The average individual dose to workers engaged in SNF transfer operations at the proposed PFSF is estimated as 0.0433 Sv/yr (4.33 rem/yr) which is within the NRC's regulatory limit of 0.05 Sv/yr (5 rem/yr) for workers.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts to workers for this alternative would be similar to those from the proposed action, except transportation impacts, discussed below.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The impacts to workers for this alternative would be similar to those from the proposed action.	There would be small, incremental doses to workers during the construction and operation of new or expanded at-reactor storage facilities; however, these doses would be expected to be less than the proposed action and a small fraction of the doses from operation of the existing nuclear power station.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Human Health from Transportation of SNF					
Incident-Free Transportation. SMALL. The potential impacts for moving SNF by rail to the proposed PFSF are estimated to be no greater than the equivalent of a latent cancer fatality (LCF) of 0.0918 among members of the public along the rail routes for shipment of SNF to the PFSF over a 20-year period. The train crew would receive a dose no greater than the equivalent of an LCF of 0.00976.	The impacts for this alternative are considered similar to those identified for the proposed action.	The potential impacts are estimated to be no greater than the equivalent of an LCF of 0.094 among members of the public along the rail and ITF-PFSF truck routes for shipment of SNF to the PFSF over a 20-year period. This is slightly higher than the proposed action because of the doses to the public from transporting the casks to the site via Skull Valley Road. The impacts to workers would be higher than the proposed action due to worker exposures at the ITF. Based on PFS's current projections, occupational doses to individual workers who are involved both in activities at the proposed PFSF and the ITF could be as much as 5.3 rem annually; however, PFS is required to maintain doses below the NRC regulatory limit of 5.0 rem/yr, so the impact of worker doses should be small.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The annual impacts of shipping SNF by rail to the Wyoming site are estimated to be no greater than the equivalent of an LCF of 0.0854 for members of the public along the rail routes. The train crew would receive an annual dose no greater than the equivalent of an LCF of 0.0094.	Construction or expansion of at-reactor SNF storage facilities would require no transportation of radioactive materials beyond the boundaries of the existing nuclear station until a permanent geological repository is available. At that time, transportation impacts could be roughly comparable to those involved under Alternative 1.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Non-Radiological Accidents during Transportation. SMALL. The statistical number of vehicle-related accidents associated with the shipment of SNF by rail to Skull Valley is estimated to result in 1.48 injuries and 0.78 fatalities over a 40-year period for the proposed PFSF.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The statistical number of vehicle-related accidents during shipments to the Wyoming site is estimated to result in 1.72 injuries and 0.92 fatalities over a 40-year period.	Construction or expansion of at-reactor SNF storage facilities would require no transportation of radioactive materials beyond the boundaries of the existing nuclear station until a permanent geological repository is available. At that time, transportation impacts could be roughly comparable to those involved under Alternative 1.
Radiological Accidents during Transportation. SMALL. The potential impacts of accidents during the shipment of SNF by rail to the proposed PFSF are estimated to be no greater than the equivalent of an LCF of 0.042 among members of the public along the rail routes for shipments of SNF to the PFSF over a 20-year period.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts for this alternative are considered similar to those identified for Alternative 3.	The potential impacts of accidents during the shipment of SNF by rail to the Wyoming site are estimated to be no greater than the equivalent of an LCF of 0.0365 among members of the public along the rail routes for shipments of SNF to the PFSF over a 20-year period.	Construction or expansion of at-reactor SNF storage facilities would require no transportation of radioactive materials beyond the boundaries of the existing nuclear station until a permanent geological repository is available. At that time, transportation impacts could be roughly comparable to those involved under Alternative 1.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Environmental Justice					
SMALL. There are no disproportionately high and adverse impacts on low income or minority populations. All adverse effects that might disproportionately affect low income or minority populations would be small. Members of the Skull Valley Band would benefit from the proposed PFSF lease payments and employment.	There are no disproportionately high and adverse impacts on low income or minority populations	There are no disproportionately high and adverse impacts on low income or minority populations	. There are no disproportionately high and adverse impacts on low income or minority populations	Because this site is not on tribal trust land, the local Native American community would not benefit from lease payments, although members of local tribes might benefit from employment because of the facility. There are no disproportionately high and adverse impacts on low income or minority populations.	Construction or expansion of at-reactor storage facilities would commit only small amounts of additional land, in most cases already under the control of the associated nuclear power station. Other environmental impacts of construction and operations are negligible for any population. Higher electricity prices resulting from construction or expansion of at-reactor storage facilities would not fall more heavily on minority or low-income populations.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Noise					
SMALL. Noise from large-scale construction would be discernable, although probably not annoying, at outdoor locations near the nearest resident. Construction of a rail line near Interstate 80 would not add appreciably to existing noise levels within passing vehicles. Noise from operation would arise primarily from locomotives transporting casks through Skull Valley to the proposed PFSF. Because the proposed new rail line is on the western side of the valley, and away from the populated eastern side, and because trains are infrequent (about two trains per week) the noise is not expected to be annoying.	The impacts for this alternative are considered similar to those identified for the proposed action.	Noise impacts of hauling casks along Skull Valley Road would add noticeably to already existing noise levels there. Therefore, noise impacts to persons in the area would be greater than for the rail line option.	The impacts for this alternative are considered similar to those identified for Alternative 3.	There are no discernable differences between noise impacts at the Wyoming sites and the Utah sites. Noise from construction and operation would occur closer to more people at the Wyoming sites, but background noise is already higher there due the greater amount of human activity.	Some local noise impacts might occur near existing nuclear stations if at-reactor facilities need to be expanded; however, these impacts are expected to be small.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Scenic Qualities					
MODERATE. Construction and operation would have the direct impact of changing the scenic quality of Skull Valley by introducing an industrial presence into a largely undeveloped landscape. This change would represent small to moderate impacts to recreational viewers, residents of Skull Valley, and motorists traveling Skull Valley Road and Interstate 80.	Impacts for the proposed PFSF located at Site B would be similar to those at Site A. However, visual impacts could be slightly larger because of the additional 10 ha (24 acres) of land needed for the rail corridor to Site B.	Impacts would be smaller than under Alternatives 1 and 2 because no new rail line would be needed. However, impacts would still be moderate to some viewers.	The impacts for this alternative are considered similar to those identified for Alternative 3.	Visual impacts would be similar to the proposed action for the ISFSI. Visual impacts of transportation facilities would be less than for the proposed action because the rail line Is shorter, and the Wyoming site environs are somewhat more developed already.	Would result in smaller visual impacts than the other alternatives. Relatively minor visual impacts would be expected to occur at existing nuclear power plants.

Table 9.1 (continued)

Potential impacts of alternatives					
Alternative 1 (proposed action, Site A, rail)	**Alternative 2 (Site B, rail)**	**Alternative 3 (Site A, ITF)**	**Alternative 4 (Site B, ITF)**	**Wyoming alternative[a]**	**No action**
Recreation					
SMALL. There may be some delays or inconvenience to users wishing access to recreational resources and opportunities, particularly during construction, when access to these resources in Skull Valley would be adversely affected by the movement of construction materials and workers on Skull Valley Road. Impacts to recreational resources and opportunities would be smaller during operations.	The impacts for this alternative are considered similar to those identified for the proposed action.	The impacts of constructing and operating the proposed PFSF at Site A are identical to those for the proposed action. The impacts due to construction and use of the ITF and shipment of SNF by heavy-haul tractor trailer along Skull Valley Road are expected to be almost non-existent during construction (since the site of the ITF is close to Interstate 80 and is not expected to affect recreational resources) and should result in temporary delays during operations for users traveling along Skull Valley Road to access recreational resources in Skull Valley. This impact to Skull Valley Road during operations would not occur under Alternative 1 (the proposed action).	The impacts for this alternative are considered similar to those identified for Alternative 3.	The Wyoming site is located in a remote, sparsely populated area, and the impacts to recreation of constructing and operating a facility at the Wyoming site are expected to be similar to those at the remote Skull Valley site.	The potential effects on recreation would depend on the site and the type of expansion required. The impacts at any given nuclear plant would likely be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored.

[a]The Wyoming site has been compared to the proposed site (i.e., Site A in Skull Valley) only to determine if it is obviously superior to the Skull Valley site selected by PFS. See the discussion in the introduction to Chapter 7 in this FEIS.

10. AGENCIES CONSULTED

During the preparation of this document, the following agencies and organizations were contacted to provide data, regulatory information, or jurisdictional information for use in this FEIS.

10.1 Federal

- U.S. Department of Commerce, Census Bureau
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration
- U.S. Department of Defense, U.S. Air Force (including Headquarters, Langley Air Force Base, and Hill Air Force Base)
- U.S. Department of Defense, U.S. Army (including the Corps of Engineers and Dugway Proving Ground)
- U.S. Department of Health and Human Services, Indian Health Service
- U.S. Department of Interior, Fish and Wildlife Service
- U.S. Environmental Protection Agency
- U.S. Geological Survey

10.2 Tribes

- Skull Valley Band of Goshute Indians
- Other Federally Recognized Indian Tribes in the vicinity of Skull Valley, Utah (see Appendix B)

10.3 State

- State of Utah, Office of Comprehensive Planning
- State of Utah, Historic Preservation Office
- State of Utah and Tooele County Agencies contacted on behalf of this FEIS's Cooperating Agencies by the license applicant, Private Fuel Storage, L.L.C.

  – Utah Department of Environmental Quality
  – Utah Department of Natural Resources
  – Utah Division of Wildlife Resources
  – Tooele County Planning Department

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- U.S. Department of Defense, U.S. Army (including the Corps of Engineers and Dugway Proving Ground)
- U.S. Department of Health and Human Services, Indian Health Service
- U.S. Department of Interior, Fish and Wildlife Service
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  – Utah Department of Environmental Quality
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13. INDEX