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Final
Environmental Impact Statement
for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah

Docket No. 72-22
Private Fuel Storage, L.L.C.

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ABSTRACT

Private Fuel Storage, L.L.C. (PFS), proposes to construct and operate an independent spent fuel storage installation on the Reservation of the Skull Valley Band of Goshute Indians. The Reservation is located geographically within Tooele County, Utah. Spent nuclear fuel (SNF) would be transported by rail from existing U.S. commercial reactor sites to Skull Valley. To transport the SNF from the existing rail line to the proposed facility, PFS proposed to construct and operate a rail siding and a 51-km (32-mile) rail line from the existing rail line near Low, Utah, to the Reservation.

This final environmental impact statement evaluates the potential environmental impacts of the PFS proposal. The document discusses the purpose and need for the PFS proposed facility, describes the proposed action and its reasonable alternatives, describes the environment potentially affected by the proposal, presents and compares the potential environmental impacts resulting from the proposed action and its alternatives, and identifies mitigation measures that could eliminate or lessen the potential environmental impacts.

The PFS proposal requires approval from four federal agencies: the U. S. Nuclear Regulatory Commission, the U.S. Department of Interior's Bureau of Indian Affairs and Bureau of Land Management, and the U.S. Surface Transportation Board. The actions required of these agencies are administrative. The environmental issues that each of these agencies must evaluate pursuant to the National Environmental Policy Act of 1969 (NEPA) are interrelated; therefore; the agencies have cooperated in the preparation of this final environmental impact statement, and this document serves to satisfy each agency's statutory responsibilities under NEPA.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
μCi	micro-curies
μg	microgram
ABS	automatic block system
ACE	U.S. Army Corps of Engineers
ACEC	area of critical environmental concern
ADT	average daily traffic
AIRS	Aerometric Information Retrieval System
ALAPCO	Association of Local Air Pollution Control Officials
ALARA	as low as reasonably achievable
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	best management practices
BNSF	Burlington Northern Santa Fe (Railway)
BWR	boiling-water reactor
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
cfs	cubic feet per second
Ci	Curie
cm	centimeter
CO	carbon monoxide
CRUD	Chalk River unidentified deposits
CTC	centralized traffic control
CWA	Clean Water Act
dB(A)	decibels (on the A-weighted scale)
DEIS	draft environmental impact statement
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
EIS	environmental impact statement
EJ	environmental justice

EO	Executive Order
EPA	U.S. Environmental Protection Agency
ER	environmental report
ERI	Energy Resources International
ESA	Endangered Species Act
Fed. Reg.	Federal Register
FEIS	final environmental impact statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FLPMA	Federal Land Policy and Management Act
FR	Federal Register
ft	feet
FWS	U.S. Fish and Wildlife Service
g	gram
gal	gallons
GLO	Government Land Office
gpm	gallons per minute
ha	hectare
HHT	heavy haul truck
HMP	habitat management plan
hr	hour
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ISB	intermountain seismic belt
ISCST	Industrial Source Complex Short-Term (air dispersion model)
ISFSI	independent spent fuel storage installation
ITF	Intermodal Transfer Facility
kg	kilogram
km	kilometer
kW	kilowatt
L	liter
LCF	latent cancer fatality
L.L.C.	Limited Liability Company
LOS	level of service
m	meter
m^3	cubic meters
MEI	maximally exposed individual
MGTM	million gross ton-miles per mile
min	minute
mph	miles per hour
mrem	millirem
MRS	monitored retrievable storage (facility)

MTU	metric tons of uranium [note: 1 metric ton = 2,200 pounds = 1.1 tons]
mSv	milliSievert
MWD/MTU	megawatt-days per MTU
MY	Maine Yankee (nuclear plant)
NAAQS	National Ambient Air Quality Standards
NAS	National Academy of Sciences
NBS	National Biological Service
NCRP	National Council on Radiation Protection and Measurements
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMSS	Nuclear Material Safety and Safeguards
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_2	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSC	National Safety Council
NWN	Nuclear Waste Negotiator
NWPA	Nuclear Waste Policy Act of 1982
NWPAA	Nuclear Waste Policy Amendments Act of 1987
O_3	ozone
OCA	owner-controlled area
OFF	oldest fuel first
OGO	Ohngo Gaudadeh Devia
OHV	off-highway vehicle
OSHA	Occupational Safety and Health Administration
Pb	lead
pCi	pico-Curies
PFS	Private Fuel Storage, L.L.C.
PFSF	Private Fuel Storage Facility
pH	a unit of measure for acidity (lower numbers) and alkalinity (higher numbers)
PM-10	particulate matter less than 10 microns in diameter
PM-2.5	particulate matter less than 2.5 microns in diameter
PMF	probable maximum flood
PNL	Pacific Northwest Laboratory
ppm	parts per million
PSD	Prevention of Significant Deterioration
PSHA	probabilistic seismic hazard analysis
PWR	pressurized-water reactor
RA	restricted area
R8W	Range 8 West

RCRA	Resource Conservation and Recovery Act
RMP	resource management plan
ROD	Record of Decision
SAR	Safety Analysis Report
SDWA	Safe Drinking Water Act
SER	Safety Evaluation Report
SHPO	State Historic Preservation Office
SLCIA	Salt Lake City International Airport
SNF	spent nuclear fuel
SO_2	sulfur dioxide
SPCC	spill prevention, control, and countermeasures
STAPPA	State and Territorial Air Pollution Program Administrators
STB	U.S. Surface Transportation Board
Sv	Sievert
TDS	total dissolved solids
TEDE	total effective dose equivalent
T5S	Township 5 South
THPO	Tribal Historic Preservation Office
TLD	thermoluminescent dosimeter
UAC	Utah Administrative Code
UDEQ	Utah Department of Environmental Quality
UDNR	Utah Department of Natural Resources
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
UPDES	Utah Pollution Discharge Elimination System
USC	United States Code
USDA	U.S. Department of Agriculture
UDWR	Utah Division of Wildlife Resources
UTTR	Utah Test and Training Range
VOCs	volatile organic compounds
WSA	wilderness study area
WHA	wildlife habitat area
yd^3	cubic yards
yr	year

EXECUTIVE SUMMARY

BACKGROUND

Private Fuel Storage L.L.C. (PFS) is a limited liability company owned by eight U.S. companies: Indiana-Michigan Power Company (American Electric Power), Entergy Corporation, GPU Nuclear Corporation, Xcel Energy, Florida Power and Light Company, Southern Nuclear Operating Company, Southern California Edison Company, and Genoa FuelTech, Inc. PFS has applied to the Nuclear Regulatory Commission (NRC) for a license to receive, transfer, and store spent nuclear fuel (SNF) from commercial nuclear power plants at a privately owned independent spent fuel storage installation (ISFSI) which it proposes to construct and operate [also called the Private Fuel Storage Facility (PFSF)]. PFS has identified a location for this facility on the Reservation of the Skull Valley Band of Goshute Indians (the Reservation) approximately 44 km (27 miles) west-southwest of Tooele, Utah. The proposed PFSF would be built on a 330-ha (820-acre) site about 6 km (3.5 miles) from the Skull Valley Band's village. In addition to the proposed PFSF, PFS proposes to construct and operate a 51-km (32-mile) rail line on public land administered by the U.S. Department of Interior's Bureau of Land Management (BLM). The proposed rail line is needed to transport SNF from the nearest main rail line to the proposed PFSF.

As part of evaluating the potential environmental impacts of the PFS proposal, this Final Environmental Impact Statement (FEIS) was prepared by the staff of the NRC, in cooperation with the U.S. Department of Interior's Bureau of Indian Affairs (BIA), BLM, and the U.S. Surface Transportation Board (STB). Under the requirements of the National Environmental Policy Act of 1969 (NEPA), NRC is the lead agency for preparing this FEIS, and BIA, BLM, and STB are Cooperating Agencies. The FEIS is a tool to help NRC and the Cooperating Agencies reach decisions regarding PFS's proposal—specifically, NRC must decide whether to grant or deny a 20-year license to PFS to receive, transfer, and store SNF on the Reservation. BIA's action is either to approve or disapprove a lease for up to 50 years between PFS and the Skull Valley Band for use of Reservation land to construct and operate the proposed PFSF. BLM's action is either to grant or deny one of two requests for rights-of way, including amending the existing land use plan if necessary, to address transporting SNF across BLM land from the existing rail line to the proposed PFSF site. STB's action is to grant or deny PFS's application for a license to construct and operate a new rail line to the proposed PFSF site.

The activities and potential environmental impacts associated with construction and operation of the proposed PFSF and rail line are described in this FEIS, including (1) the purpose of and the need for the proposed action, (2) alternatives to the proposed action, (3) the environmental resources that could be affected by the proposed action and alternatives, (4) the potential environmental consequences of the proposed action and alternatives, (5) recommended mitigation measures, and (6) the economic costs and benefits associated with the proposed action. The evaluation of the potential impacts is based on a comprehensive review of PFS's license application, its environmental report, related submittals, independent information sources, and written and oral comments on the Draft EIS (DEIS).

The Cooperating Federal Agencies sought public comments on the DEIS by (1) publishing a notice of availability for the DEIS in the *Federal Register* in which an opportunity to comment on the DEIS was offered and (2) posting the document on the NRC website, together with a form for submitting comments. In addition, the NRC and Cooperating Agencies conducted a series of four public meetings to receive comments on the DEIS in Salt Lake City and Grantsville, Utah, and transcribed the public comments from approximately 145 people who spoke at these meetings. Public comments were accepted by U.S. mail, e-mail, and facsimile transmission for the entire 90-day public comment period set in the *Federal Register* notice. The NRC received 264 written documents, letters, e-mails, and faxes.

THE PROPOSED ACTION

The proposed action (Alternative 1) involves the construction and operation of the proposed PFSF at a site (designated as Site A) located in the northwest corner of the Reservation and a new rail line connecting the existing Union Pacific railroad to the site. The proposed PFSF would be designed to store a lifetime capacity of up to 40,000 metric tons of uranium (MTU) (44,000 tons) of SNF. The capacity of the proposed PFSF would be sufficient to store all the SNF from reactor sites owned by PFS members, as well as SNF from reactor sites that are not owned by PFS members.

Construction of the proposed PFSF would occur in three phases. Phase 1 construction, which would provide an operational facility, is planned to begin upon issuance of the NRC license and approval of the BIA lease and would be completed in approximately 18 months. About one-fourth of the storage area for the proposed PFSF would be constructed during Phase 1. Another one-fourth would be completed during Phase 2, with the remaining portion constructed during Phase 3. The maximum amount of SNF that the applicant could accept at the proposed PFSF over the term of the initial license and the lease is 40,000 MTU (44,000 tons) of SNF. Once the applicant has accepted 40,000 MTU of SNF, the applicant could not accept any additional SNF shipments, even if the applicant has begun to ship SNF off site.

The nearest main rail line is approximately 39 km (24 miles) north of the proposed site. PFS's preferred option for transporting SNF from the existing Union Pacific main line railroad to the site is to build a new rail line to the site. The new rail line, and its associated rail siding, would connect to the existing Union Pacific main rail line at Skunk Ridge (near Low, Utah) (see Figure ES.1). The proposed right-of-way for the rail corridor would be 51 km (32 miles) long and 60 m (200 ft) wide. It would run to the proposed PFSF site through public lands administered by BLM on the eastern side of the Cedar Mountains.

At commercial nuclear power plants, the SNF to be shipped to the proposed PFSF would be placed inside sealed metal canisters. These canisters would then be placed inside NRC-certified steel shipping casks for transport by rail to the new rail siding at Skunk Ridge. Dedicated trains—stopping only for crew changes, refueling, and periodic inspections—would be used to transport SNF from the existing reactor sites to Skull Valley. PFS expects that it would receive 1 to 2 trains, each carrying 2 to 4 shipping casks, per week from the reactor sites. The number of loaded spent fuel canisters (inside shipping casks) is estimated to be between 100 and 200 annually. Each canister would contain approximately 10 MTU of SNF.

At the proposed PFSF, a dry cask storage technology would be used. The sealed metal canisters containing the SNF would be unloaded from the shipping casks at the proposed PFSF, loaded into steel-and-concrete storage casks, and then placed on concrete pads for storage. The canister-based cask system for confining the SNF would be certified by NRC in accordance with NRC requirements

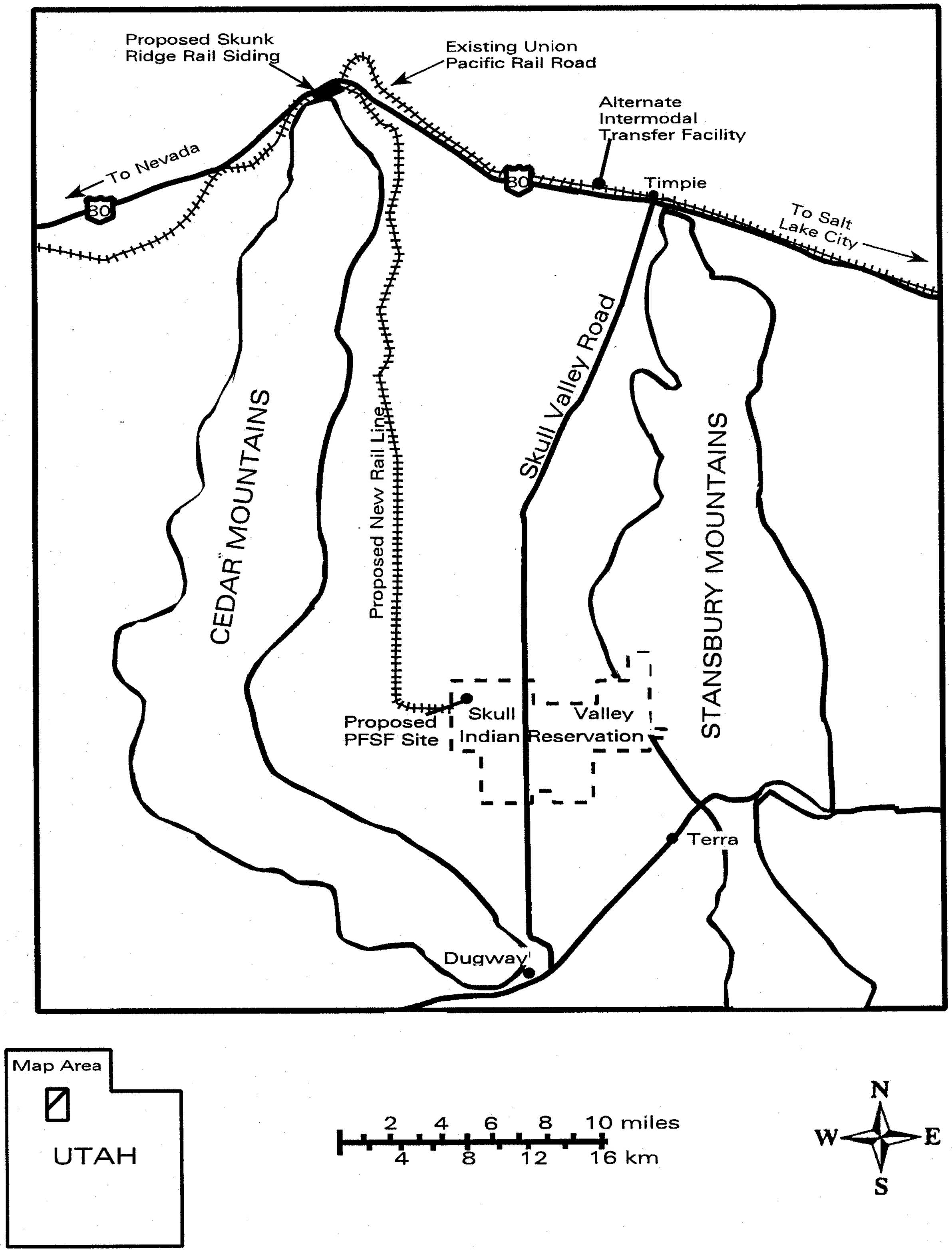

Figure ES.1. The proposed project area in Skull Valley, Utah.

(10 CFR Part 72). PFS proposes to employ the Holtec HI-STORM dual-purpose canister-based cask system for use at the proposed PFSF. PFS anticipates storing as many as 4,000 sealed metal canisters inside individual storage casks, to store a maximum of 40,000 MTU (44,000 tons) of SNF.

The proposed PFSF would be licensed by the NRC to operate for up to 20 years. The lease between the Skull Valley Band and PFS would have an initial term of 25 years with an option for an additional 25 years (for a total of 50 years). The applicant has indicated that it may seek to renew the NRC license for an additional 20 years (for a total of 40 years). If the NRC grants the application, and if PFS requests and obtains a renewed license and exercises the lease renewal option, the lease would extend for 10 years beyond the expiration of the NRC license. Since radiological decommissioning would normally be expected to be completed within approximately 24 months of NRC license expiration, in accordance with 10 CFR 72.54, there would be sufficient time to complete all decommissioning activities, including non-radiological decommissioning, during the term of the lease.

By the end of the licensed life of the proposed PFSF and prior to the expiration of the lease, it is expected that the SNF would have been shipped to a permanent repository. This is consistent with the NRC's Waste Confidence Decision (55 *Fed. Reg.* 38474; Sept. 18, 1990), which states that at least one mined geological repository will be available by the end of 2025. On December 6, 1999, the NRC issued a *Federal Register* Notice (64 *Fed. Reg.* 68005) which presented a status report on the Commission's review of the Waste Confidence Decision. The status report stated that "[t]he Commission is of the view that experience and developments since 1990 confirm the Commission's 1990 Waste Confidence findings." Service agreements (i.e., contracts) between PFS and companies storing SNF at the proposed PFSF will require that these companies remove all SNF from the proposed PFSF by the time the PFS license is terminated and PFS has completed its licensing or regulatory obligations under the NRC license. The service agreement requirement to remove the SNF from the proposed PFSF is not dependent upon the availability of a permanent geological repository. Therefore, if the PFS license is terminated prior to the availability of a permanent geological repository, the reactor licensees storing SNF at PFSF would continue to retain responsibility for the fuel and must remove it from the proposed PFSF site before termination of the PFS license.

PURPOSE AND NEED FOR THE PROPOSED ACTION

Storage of SNF at commercial nuclear reactors sites is an increasingly important concern to the companies operating these facilities. U.S. nuclear power plants were not designed to store all the SNF generated throughout their operating lives. To date, electric generation companies have been coping with the SNF storage problem primarily by employing two methods to increase at-reactor SNF storage capacity: (1) expanding the capacity of spent fuel pools to store SNF and (2) constructing ISFSIs at the reactor site (also called "at-reactor ISFSIs"). Although many U.S. nuclear power plants, including most of the plants owned by the PFS members, have already expanded the capacity of their spent fuel pools to store SNF, several are still running out of storage space. In fact, some spent fuel pools no longer have storage space sufficient to accommodate the unloading of an entire reactor core (full core offload capability). It is projected that 80 percent of U.S. reactors will lose full core off-load capability by 2010, without additional storage capacity.

The purpose of the proposed PFSF is to satisfy the need for an interim facility that would serve as a safe, efficient, and economical alternative to continued SNF storage at reactor sites. PFS has indicated that such an interim facility would ensure that (1) operation of a nuclear power plant would not cease because of a lack of SNF pool storage capacity; (2) permanently shut-down reactors could be decommissioned sooner, resulting in a savings to the reactor licensees and earlier use of the land for other activities; and (3) for some reactor licensees, an economical alternative to at-reactor ISFSIs would be available. In addition, the proposed action would serve the Skull Valley Band's economic development, consistent with the trust responsibility of the Federal government.

In 1977, the U.S. Department of Energy (DOE) announced that the Federal government would accept and take title to the SNF from U.S. commercial power reactors. This policy was designed to meet the needs of nuclear reactor licensees for both interim and permanent disposition of SNF. A proposed permanent geological repository is projected to be completed by DOE and could begin receiving commercial reactor SNF by 2010. Before a permanent repository becomes available, however, several nuclear power generating companies anticipate that their on-site SNF pool storage capacity may become inadequate. As a result, these companies see an interim approach for storage of SNF in away-from-reactor facilities as a viable option instead of the use of at-reactor facilities for SNF storage. However, ownership and ultimate responsibility for the SNF would continue to remain with the originating companies until the ownership of the SNF is transferred to DOE.

ALTERNATIVES

This FEIS includes analysis of the environmental impacts of several alternative actions, both on and off the Reservation:

- Alternative 1: PFS's proposed action (as described above): Construction and operation of the proposed PFSF at the proposed location (Site A) on the Reservation, a new rail siding at Skunk Ridge, and a new rail line connecting the Skunk Ridge siding with Site A.
- Alternative 2: Construction and operation of the proposed PFSF at an alternative location (Site B) on the Reservation, with the same Skunk Ridge rail siding and rail line as described under Alternative 1.
- Alternative 3: Construction and operation of the proposed PFSF at Site A, and construction and operation of a new Intermodal Transfer Facility (ITF) near Timpie, Utah, with the use of heavy-haul vehicles to move SNF down the existing Skull Valley Road.
- Alternative 4: Construction and operation of the proposed PFSF at Site B, with the same ITF as described under Alternative 3.
- PFS also identified a site in Fremont County, Wyoming, as an alternative, secondary site, although PFS has elected to pursue the leasing and development of only the Skull Valley site. Although NRC compares the proposed site (i.e., Site A) to identified alternative sites, it makes the comparisons only to determine if such an alternative site is obviously superior to the proposed site (49 *Fed. Reg.* 9352, 9354, March 12, 1984).
- The no-action alternative is evaluated and compared with the other alternatives.

These alternatives are described in the following paragraphs.

Alternative 2

This alternative involves constructing the proposed PFSF at an alternative location (Site B) on the Reservation. This site is located about 800 m (0.5 mile) south of the proposed site (Site A) and is similar in terms of its environmental characteristics to the proposed site. Under this alternative, a new rail line would be constructed from Skunk Ridge. The rail corridor through Skull Valley would be essentially identical to the one for the proposed action, but it would be about 1.6 km (1 mile) longer due to the slightly greater distance of Site B from the existing main rail line.

Alternative 3

Under this alternative, the proposed PFSF would be constructed at Site A, but transportation of SNF from the existing Union Pacific main rail line to the site would be accomplished by heavy-haul tractor/trailers. An Intermodal Transfer Facility (ITF) and rail siding would be built on land managed by BLM at the existing main rail line near Timpie, Utah, to transfer SNF shipping casks from rail cars to the heavy-haul vehicles, which would then transport the SNF along the existing Skull Valley Road to the site. No rail line would be built under this alternative.

Alternative 4

This alternative would be identical to Alternative 3 except that the proposed PFSF would be located at Site B on the Reservation rather than at Site A. The ITF and rail siding would be located near Timpie, and transport of SNF by heavy-haul vehicles would use Skull Valley Road. No rail corridor would be built under this alternative.

The Wyoming Alternate Site

PFS's site selection process identified a site in Fremont County, Wyoming, as a candidate site for the proposed PFSF. In this FEIS, the NRC staff compares the Wyoming site to the Skull Valley site to determine if the Wyoming site is obviously superior to the proposed PFSF site. The Wyoming site is located on privately owned land north of Shoshoni, Wyoming, about 39 km (24 miles) northeast of Riverton and about 9 km (6 miles) east of the Wind River Indian Reservation. The analysis assumes that the layout of a facility at the Wyoming site and its design would be similar to the proposed PFSF in Skull Valley. An existing railroad runs adjacent to the site and would require approximately 1.5 km (1 mile) of new rail construction for access to the site.

Although the Wyoming site is not being actively considered by PFS for the siting of an ISFSI, it is nevertheless appropriate for use by NRC in this FEIS for comparative purposes. Neither BLM's decision nor STB's decision involves the choice between the proposed site in Skull Valley and other alternative sites. However, under its government-to-government relationship with the Skull Valley Band and its trust responsibilities with the Band, BIA considers the Wyoming site to be an unreasonable alternative.

No-Action Alternative

The no-action alternative would be not to build the proposed PFSF in Skull Valley. Under the no-action alternative, NRC would deny the application for a license for the proposed PFSF. Under the no-action alternative, no lease would be approved by BIA between PFS and the Skull Valley Band, and the Skull Valley Band would be free to pursue alternative uses for the land in the northwest corner of the Reservation. Under the no-action alternative, no right-of-way approvals would be granted by BLM, and no amendments would be required for existing BLM land use plans. The public lands administered by BLM at the proposed Skunk Ridge rail siding location and along the proposed Skunk Ridge rail corridor would be available for other uses compatible with existing land use plans. Under the no action alternative, STB would deny the application for a license for the proposed rail line.

ALTERNATIVES CONSIDERED BUT NOT ADDRESSED FURTHER IN THIS FEIS

In addition to the alternatives described above, this FEIS considers other alternatives to the proposed action. These alternatives include (1) a different privately owned away-from-reactor ISFSI; (2) shipment of SNF from reactor sites without sufficient storage space to reactor sites with additional SNF storage capacity; (3) alternatives that, in effect, eliminate the need for the proposed PFSF (e.g., the Federal government taking possession of and title to the SNF in a manner that would allow sufficient on-site storage to be maintained); (4) alternative technologies available for an operational ISFSI; and (5) transportation options for moving SNF cross-country to the location of the proposed PFSF, as well as transportation options within Skull Valley. The first three of these items were eliminated from detailed evaluation in this FEIS for a combination of reasons, including (a) the absence of any evidence that these options are actually viable, (b) the unavailability of sufficient detail upon which to base a detailed evaluation, and (c) the speculative nature of such options.

In regard to the alternatives involving other storage technologies available for operational ISFSIs or options for transporting SNF, as set forth in this FEIS, the alternatives proposed by the applicant are the most viable options and none of the other possible alternatives offered any obvious advantage over those alternatives already identified, as described above, for evaluation in this FEIS. Therefore, the storage technology alternatives and the transportation alternatives were eliminated from detailed evaluation in this FEIS.

POTENTIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION—ALTERNATIVE 1

Potential environmental impacts of the proposed action and its alternatives were evaluated against standardized significance criteria. These criteria are described in the dialogue box in this section. Table ES.1 summarizes the significance levels of the potential impacts for the Skull Valley alternatives addressed in this FEIS (i.e., Alternatives 1 through 4), and a brief discussion of the impacts to relevant environmental resource areas is presented in this section. Table ES.2 (at the end of this Executive Summary) gives a more detailed review and comparison of the potential impacts of the proposed action and alternatives. A detailed discussion of the impacts of the proposed action can be found in Chapters 4 and 5 of this FEIS. Further, any changes in information in Table ES.1 from that presented in the DEIS are also discussed in Chapters 4, 5, 6,7, and 8 of this FEIS.

Table ES.1. Summary of significance levels[a] of the combined potential impacts for the Skull Valley alternatives addressed in this FEIS

Potentially impacted resource or category	Proposed action (i.e., Site A with the rail corridor)—Alternative 1	Site B with the rail corridor—Alternative 2	Site A with the ITF—Alternative 3	Site B with the ITF—Alternative 4
Geology, minerals, and soils	SMALL	SMALL	SMALL	SMALL
Water resources				
Surface water	SMALL	SMALL	SMALL	SMALL
Flooding	SMALL TO MODERATE	SMALL TO MODERATE	SMALL	SMALL
Water use	SMALL	SMALL	SMALL	SMALL
Groundwater	SMALL	SMALL	SMALL	SMALL
Air quality	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE
Ecological resources				
Vegetation	SMALL	SMALL	SMALL	SMALL
Wildlife	SMALL	SMALL	SMALL	SMALL
Wetlands	SMALL	SMALL	SMALL	SMALL
Perennial and ephemeral streams	SMALL	SMALL	SMALL	SMALL
Threatened and endangered species	SMALL	SMALL	SMALL	SMALL
Socioeconomics and community resources				
Human population	SMALL	SMALL	SMALL	SMALL
Housing	SMALL	SMALL	SMALL	SMALL
Education	SMALL	SMALL	SMALL	SMALL
Utilities	SMALL	SMALL	SMALL	SMALL
Solid and sanitary waste	SMALL	SMALL	SMALL	SMALL
Traffic	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE
Economic structure[b]	SMALL TO MODERATE (but beneficial)	SMALL TO MODERATE (but beneficial)	SMALL TO MODERATE (but beneficial)	SMALL TO MODERATE (but beneficial)
Land use (including rangeland and impacts to military overflight operations)	SMALL TO MODERATE	SMALL TO MODERATE	SMALL	SMALL

Table ES.1. Continued

Potentially impacted resource or category	Proposed action (i.e., Site A with the rail corridor)—Alternative 1	Site B with the rail corridor—Alternative 2	Site A with the ITF—Alternative 3	Site B with the ITF—Alternative 4
Cultural resources	SMALL TO MODERATE	SMALL TO MODERATE	SMALL	SMALL
Human health impacts				
Non-radiological risks to workers	SMALL	SMALL	SMALL	SMALL
Radiological doses to the public	SMALL	SMALL	SMALL	SMALL
Radiological doses to workers	SMALL	SMALL	SMALL TO MODERATE	SMALL TO MODERATE
Radiological non-transportation accidents	SMALL	SMALL	SMALL	SMALL
Transportation of SNF	SMALL	SMALL	SMALL	SMALL
Radiological transportation accidents	SMALL	SMALL	SMALL	SMALL
Non-radiological transportation accidents	SMALL	SMALL	SMALL	SMALL
Noise	SMALL	SMALL	SMALL	SMALL
Scenic qualities	MODERATE	MODERATE	MODERATE	MODERATE
Recreation	SMALL	SMALL	SMALL	SMALL
Environmental justice	SMALL	SMALL	SMALL	SMALL

[a]Significance levels in this table represent the combination of impacts addressed in detail in Chapters 4 and 5 of this FEIS.
[b]Economic benefits to the Skull Valley Band would be large.

DETERMINATION OF THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS

A standard of significance has been established by NRC (see NUREG-1437) for assessing environmental impacts. With the standards of the Council on Environmental Quality's regulations as a basis, each impact is to be assigned one of the following three significance levels:

- ***Small***. The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

- ***Moderate***. The environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

- ***Large***. The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

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 or 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 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. On site wells would provide a small fraction of the total water used during construction of the proposed PFSF. During operation of the proposed PFSF, groundwater use is expected to be small. 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 under “Mitigation Measures.” 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; these volumes represent a fraction of the available water resources in the area 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 surface water flow during floods. All drainage features under access route embankments, including the access road and the rail line, would be 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 Cooperating Agencies propose be required with respect to surface water are set forth below under “Mitigation Measures.”

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 under “Mitigation Measures.”

Ecological Resources

Impacts would 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 under “Mitigation Measures.”

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 are 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 under “Mitigation Measures.”

No significant impacts would be expected to occur to wildlife 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 under “Mitigation Measures.”

Socioeconomics 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 traffic 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 under "Mitigation Measures."

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. 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 PFSF 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 and additional employment opportunities 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 ethnographic 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 (NHPA), 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 significantly 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 under “Mitigation Measures.”

Indian Trust Assets

Indian trust assets are the land and the products of the land. The proposed lease 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 other mitigation measures are incorporated into the design and operations of the proposed PFSF. If any unexpected impacts on Indian cultural resources were discovered during construction, these activities would cease; and the BIA and the Skull Valley Band would be notified immediately to determine the appropriate steps to take regarding further protections of such resources. The mitigation measures the Cooperating Agencies propose be required with respect to these cultural resources are set forth below under “Mitigation Measures.”

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 Skull Valley 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. While the Skull Valley Band has the option of retaining any or all the buildings and other improvements once the radiological decommissioning is completed, PFS has stated that it would be willing to remove the facility and related infrastructure at the end of the license 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 from 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.

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 U.S. Fish and Wildlife Service regarding threatened or endangered species that might 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 related rail facilities. 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 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 Agreement 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 Band.

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 on the *National Register*, 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 listing 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.

Summary of the Costs and Benefits of the Proposed Action

Economic costs and benefits

The computation of the economic benefit for the proposed action has two parts: (1) the costs of storing SNF at existing reactor sites that can be avoided due to the availability of the additional storage capacity at the proposed PFSF, and (2) the costs of constructing and operating the proposed PFSF. The net economic benefit of the proposed action is the mathematical difference between these two costs. A positive value indicates that the costs associated with the proposed PFSF are less than the costs associated with at-reactor storage (i.e., the no-action alternative).

From an economic perspective, the net economic 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[1] 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 precisely or 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[2] of 10,000 MTU and a throughput of at least 15,500 MTU have a greater likelihood of positive net benefits.

Environmental benefits and costs of the proposed action

The socioeconomic environment of the Reservation would be improved by 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. The Skull Valley Band has indicated in several documents and interviews that the revenue generated by the proposed PFSF would afford the Skull Valley Band 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 also benefit economically from the monies spent buying and manufacturing items for use at the proposed PFSF.

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[1] "Throughput" is the amount of SNF that would be stored over the life of the proposed PFSF.

[2] "Capacity" is the amount of SNF that could be stored at the proposed PFSF at any one time.

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 these reactors would lead to the reduced availability of electric power or the need to obtain replacement power from other sources.

The environmental costs of the proposed action are related to the impacts summarized in Table ES.1 and discussed above. The most important of these environmental costs are associated with 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 in addition to the average doses already received by members of the U.S. population from other sources of radiation.

Other benefits and costs of the proposed action

Construction of the proposed rail line to the proposed PFSF 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.

Before a nuclear plant site at which reactor operation permanently ceased could become entirely available for other uses, the facility would need to be completely 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 shutdown reactors to complete decommissioning sooner, resulting in a cost savings to the reactor licensees and allowing earlier use of the reactor sites for other purposes.

COMPARISON OF THE POTENTIAL ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES

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

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 impact 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.

The ITF Transportation Option

The construction of the ITF is considered in Alternatives 3 and 4 and the proposed rail is considered in Alternative 1 and 2. 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 from 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 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.

The Wyoming Alternate Site

Table ES.2 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. The NRC has no authority to decide the location of the proposed PFSF; NRC's decision is either to grant or deny PFS's application for a license for the Skull Valley location. The Wyoming site is evaluated in this FEIS for the purpose of comparing potential impacts of that site to those of the proposed PFSF in Skull Valley. 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, a precise 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 construction and operation of the proposed PFSF at the Wyoming site is obviously superior to construction and operation of the proposed PFSF at 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 above in the section on mitigation measures. 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.

The No-Action Alternative

The no-action alternative would be to not build the proposed PFSF. Under the no-action alternative,

1. NRC would deny the application for a license for the proposed PFSF;
2. BIA would not approve the lease between PFS and the Skull Valley Band, and the Skull Valley Band would be free to pursue alternative uses for the land in the northwest corner of the Reservation;

3. No right-of-way approvals would be granted by BLM, and no amendments would be required for existing BLM Land Use Plans. The public lands administered by BLM at the proposed ITF location near Timpie, as well as at the proposed Skunk Ridge rail siding location and along the proposed Skunk Ridge rail corridor would be available for other uses compatible with existing land use plans; and
4. STB would deny the application for a license for the proposed rail line.

Under the no-action alternative, reactor licensees would continue to store SNF at their reactor sites either in spent fuel pools or dry casks. The potential impacts of constructing and operating the proposed PFSF, and associated SNF transportation facilities, in Skull Valley would not occur under this alternative. Although the no-action alternative would avoid the impacts to Skull Valley (see Table ES-2), it could lead to impacts at other locations. The two most likely no-action scenarios involve the continued accumulation of SNF in existing at-reactor storage facilities and the 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 the 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, state laws) may not be able to or may not choose to expand on-site storage and might have to terminate operations before the expiration of their reactor licenses if their 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 (which states that at least one mined geological repository will be available by the end of 2025), the NRC has examined the environmental impacts of the operation of ISFSIs built at operating nuclear power plant sites. The Commission has 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 life for operation of a 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.

To date, 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. Although 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 aggregate there could be at least equivalent economic benefits from tax revenues, local payroll, and other expenditures to at-reactor communities. These benefits would stem from expenditures related to at-reactor IFSFIs and/or continued SNF storage in reactor 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.

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 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 BIA's 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 both residential areas on the Reservation and habitat for the rare Pohl's milkvetch.

Table ES.2. 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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 45 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 ES.2 (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 tax payments, local payroll, incentive payments to Tooele County, and other expenditures. 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.	In addition, 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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 (0.0356 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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 ES.2 (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 of this FEIS.

1. PURPOSE AND NEED

1.1 Introduction

Private Fuel Storage L.L.C. (PFS), a limited liability company owned by eight U.S. electric power generating companies, proposes to construct and operate a privately-owned independent spent fuel storage installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians (Reservation) (see Figure 1.1). The Reservation is bordered on all sides by Tooele County, Utah. To transport spent nuclear fuel (SNF) to the ISFSI, PFS proposes to construct and operate a rail siding and rail line on land managed by the U.S. Department of Interior’s Bureau of Land Management (BLM). The project, as proposed, requires approval from four Federal agencies: the U.S. Nuclear Regulatory Commission (NRC), the U.S. Department of Interior's Bureau of Indian Affairs (BIA) and BLM, and the U.S. Surface Transportation Board (STB). The NRC, BIA, BLM, and STB (the Cooperating Federal Agencies) have cooperated in the preparation of this final environmental impact statement (FEIS).

This FEIS evaluates the potential environmental effects of the ISFSI proposed by PFS, including the construction and operation of new transportation facilities that would provide access to the proposed ISFSI, and a consideration of alternatives to that proposal. This FEIS has been prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), NRC regulations for implementing NEPA (10 CFR Part 51), and the guidance provided by the Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 CFR Part 1500).

1.2 The Proposed Action

The proposed action would include construction and operation of the proposed ISFSI [also called the Private Fuel Storage Facility (PFSF)], including transporting SNF to the proposed PFSF, and the construction of a rail line from Skunk Ridge to the proposed PFSF site (see Figure 1.2 for project locations).

The proposed PFSF would be constructed and operated on the Reservation at a location 93 km (58 miles) straight-line distance southwest of Utah’s State Capitol Building [or about 120 km (75 miles) by road] and approximately 44 km (27 miles) west-southwest of Tooele, Utah (see Figure 1.1). PFS proposes to build the ISFSI on a 330-ha (820-acre) site leased from the Skull Valley Band of Goshute Indians (Skull Valley Band). The site (designated Site A) would be located in the northwest corner of the Reservation approximately 6 km (3.5 miles) from the Skull Valley Band's village.

The proposed PFSF would be designed to store up to 40,000 metric tons of uranium (MTU) (44,000 tons) of SNF. The capacity of the proposed PFSF would be sufficient to store all the SNF from the PFS member companies, as well as some SNF from nuclear power reactor licensees that are not members of PFS. The eight members of PFS are Entergy Corporation, Southern California Edison Company, Genoa FuelTech, Inc., Indiana-Michigan Company (American Electric Power), Florida Power and Light Company, GPU Nuclear Corporation (which does not plan to use the proposed PFSF for storage), Xcel Energy Inc., and Southern Nuclear Operating Company. (Previous members of PFS listed in the DEIS, but not listed above, have been renamed, acquired by, or merged with other companies.) The locations of their reactors are shown in Figure 1.3.

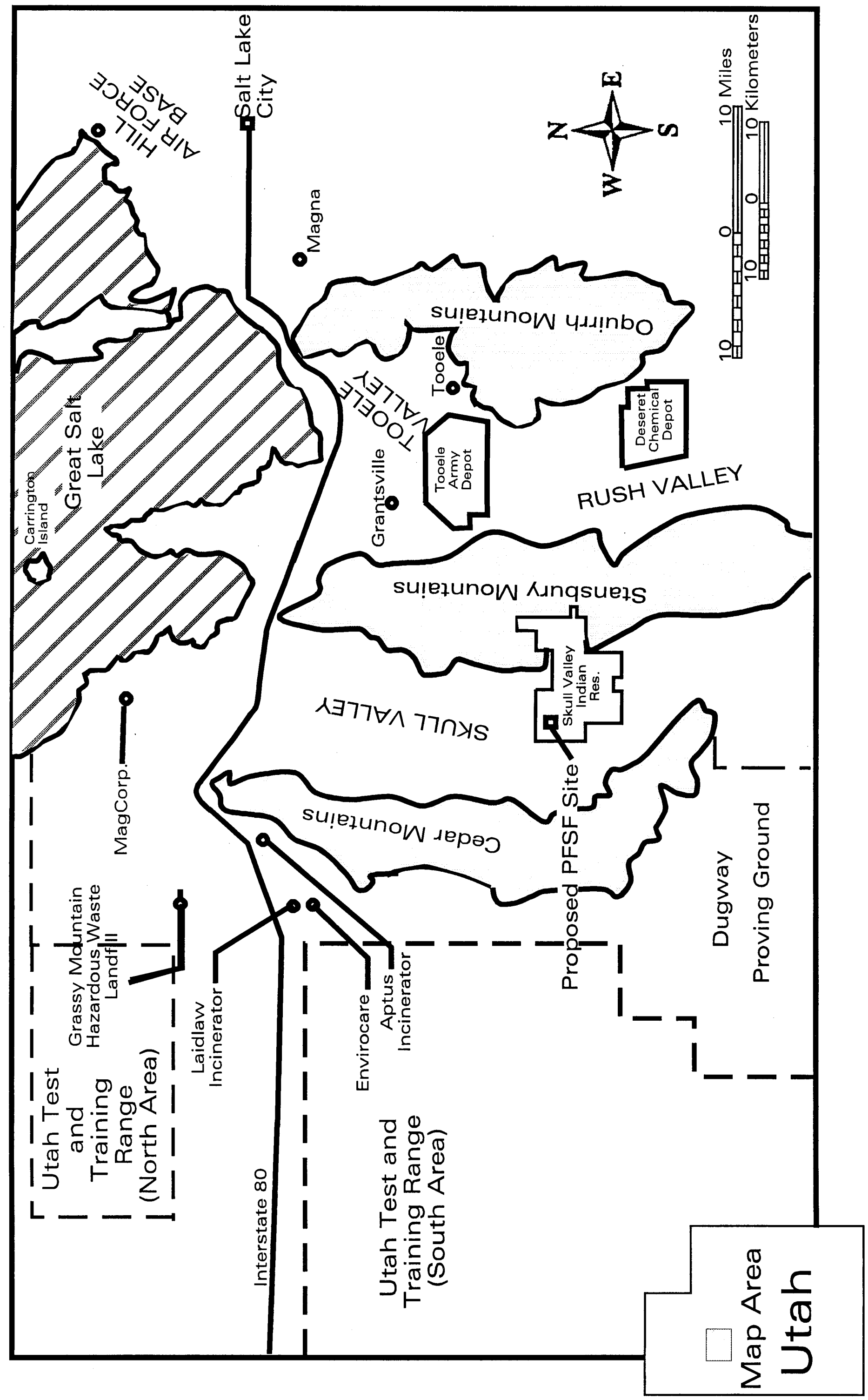

Figure 1.1. Regional location of Skull Valley in Utah.

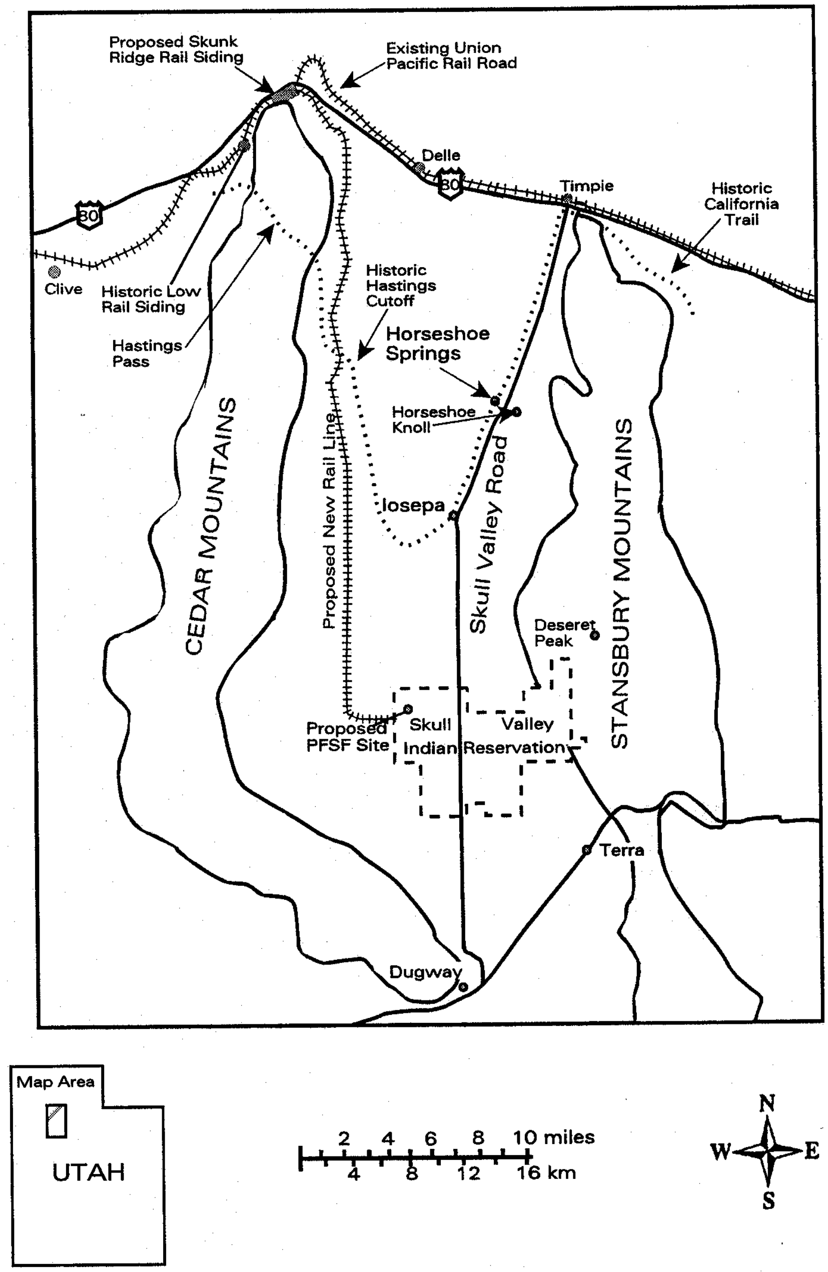

Figure 1.2. The proposed project area in Skull Valley, Utah.

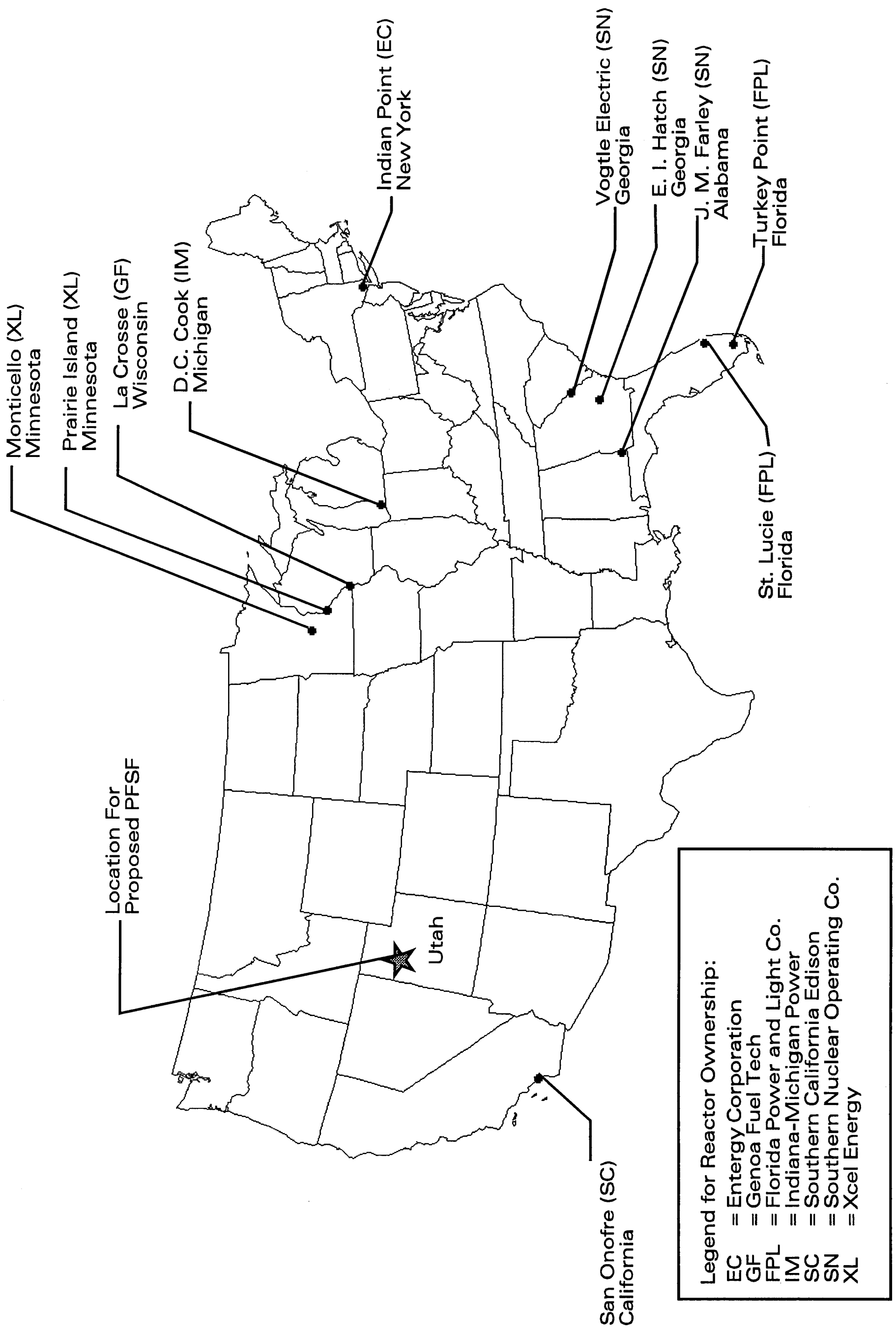

Figure 1.3. Reactors which are owned by the PFS companies.

BACKGROUND INFORMATION ON SPENT NUCLEAR FUEL

More than 100 commercial nuclear power plants have been built in the U.S. and about 20 percent of the nation's electricity comes from nuclear power. Like other industrial plants, nuclear power stations produce byproducts from their operating processes. The primary by-product from a nuclear reactor is used or "spent" nuclear fuel (SNF).

Nuclear fuel consists of enriched uranium in small, ceramic-like pellets, slightly larger than pencil erasers. These small pellets produce a tremendous amount of energy when used in a nuclear power plant. For example, a single pellet contains the energy equivalent of almost one ton of coal. The pellets are stacked end-to-end and sealed inside metal tubes 3.5 to 4.5 m (12 to 15 ft) long. The tubes containing the uranium pellets are bundled together in groups of about 200 to form nuclear fuel assemblies (DOE 1999). These fuel assemblies are placed inside a nuclear reactor and function as the core where the nuclear fission process occurs. Fission is a controlled chain reaction, in which atoms split, thereby releasing energy and producing heat. The heat is then used to generate steam and to produce electricity until the fuel becomes "spent," or no longer efficient in generating the amounts of heat needed.

Periodically about one-third of a nuclear reactor's fuel is removed and replaced with new, more efficient fuel (this is called an operating cycle and typically lasts 18–24 months). Thus a reactor may operate for 2–3 operating cycles after it loses full-core offload capability. Full core offload capability refers to a power plant's capability to remove all fuel from the reactor vessel and store it in the spent fuel pool. Radioactive materials remain inside the sealed tubes within the fuel assemblies after the assemblies have been removed from the core.

During the term of the operating license, the SNF assemblies are typically first stored under water in pools after removal from the reactor core. The water in these pools is circulated to maintain cooling and is monitored for radioactivity and for evidence of tube corrosion. Over time, the fuel assemblies lose heat and also become less radioactive. Fuel assemblies may also be stored in dry storage facilities, typically after being in the pool for five years or more.

PFS proposes to use a dual-purpose canister-based system for storage and transportation of the SNF. At the reactor sites of commercial nuclear power plants, the SNF assemblies to be shipped to the proposed PFSF would be placed in sealed metal canisters. These canisters would then be placed inside NRC-approved steel shipping casks for transport by rail to a new rail siding north of the proposed PFSF. The proposed action would allow for local transportation to the proposed PFSF site from the new rail siding via a proposed new rail line (see Figure 1.2). The number of loaded spent fuel canisters (inside shipping casks) to be received at the proposed PFSF is estimated to be between 100 and 200 annually. Each canister would contain approximately 10 MTU of SNF.

At the proposed PFSF site, dry cask storage technology would be used. The sealed metal canisters containing SNF would be loaded into steel/concrete storage casks that are then placed on concrete pads for storage. Canister-based cask systems confine radioactive wastes and would be licensed by the NRC in accordance with 10 CFR Part 72 (NRC requirements for storage of SNF). As many as 4,000 canisters in individual storage casks could be needed to store a maximum of 40,000 MTU of SNF. Phase 1 construction, which would provide an operational facility, would begin upon issuance of the NRC license and effectiveness of the BIA lease and would be completed within 18 months. Ownership and ultimate responsibility for the SNF would continue to remain with the originating utilities, until such time as responsibility for the SNF is transferred to the U.S. Department of Energy (DOE) for long-term storage or disposal. A more detailed description of the proposed project facilities and the proposed storage system is provided in Section 2.1 of this FEIS.

The maximum amount of SNF that the applicant could accept at the proposed PFSF over the term of the license is 40,000 MTU (44,000 tons). Once the applicant 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. The NRC license would not allow the applicant to accept more than 40,000 MTU of SNF over the life of the license, unless PFS requests a license amendment to increase the maximum storage capacity and the request is granted (after notice to the public and opportunity for a hearing).

The proposed PFSF would be licensed by the NRC to operate for up to 20 years. The applicant has indicated that it may seek to renew the license for an additional 20 years (total of 40 years). By the end of the licensed life of the proposed PFSF and prior to the expiration of the lease, it is expected that the SNF would have been shipped to a permanent repository. This is consistent with the NRC's Waste Confidence Decision (55 Fed. Reg. 38474; Sept. 18, 1990), which states that at least one mined geological repository will be available by the end of 2025. On December 6, 1999, the NRC issued a *Federal Register* Notice (64 Fed. Reg. 68005) which presented a status report on the Waste Confidence Decision. The status report stated that "[t]he Commission is of the view that experience and developments since 1990 confirm the Commission's 1990 Waste Confidence findings." Service agreements (i.e., contracts) between PFS and companies storing SNF at the proposed PFSF will require that the contracting companies remove all SNF from the proposed PFSF by the time the PFS license is terminated and PFS has completed its licensing or regulatory obligations under the NRC license. The service agreement requirement to remove the SNF from the proposed PFSF is not dependent upon the availability of a permanent geological repository. Therefore, if the PFS license is terminated prior to the availability of a permanent geological repository, the companies storing SNF at PFSF would continue to retain responsibility for the fuel and must remove it from the proposed PFSF site prior to termination of the PFS license.

1.3 Need for the Proposed Action

The proposed action is intended to satisfy the need for an interim facility that would provide a safe, efficient, and economical alternative to continued SNF storage at reactor sites. Such an interim facility would satisfy a need for additional storage capacity of the PFS members, as well as non-member nuclear power reactor licensees who face storage limitations, and ensure that (1) operation of a nuclear power plant would not cease before operating license expiration because of a lack of SNF storage capacity; (2) permanently shut-down reactors could be decommissioned sooner, resulting in a savings to the reactor licensees and earlier use of the land for other activities; and (3) for some reactor licensees, an economical alternative to at-reactor storage would be available. In addition, the proposed action would serve the Skull Valley Band's economic development, consistent with the BIA's trust responsibility.

Storage of SNF at commercial nuclear reactor sites is an increasingly important concern to the companies operating these facilities. As set forth below, many reactor licensees are faced with the possibility that their facilities will be unable to store sufficient SNF and be forced to halt power generation operations before their operating licenses expire.

The on-site SNF storage capacities (i.e., of spent fuel pools) of many U.S. nuclear power plants were designed to accommodate only a few reactor core discharges. The rationale was that SNF would be periodically removed from the spent fuel pool and shipped offsite for reprocessing[1] before the pool became full. However, production-scale reprocessing of SNF never materialized[2] to the extent anticipated because of the relative abundance of natural uranium and the U.S.'s concern that the use of plutonium from reprocessed civilian SNF could be used for nuclear weapons production (i.e., the non-proliferation issue) (Holt 1998). Because, the U.S. has abandoned the concept of reprocessing SNF, the "once through" nuclear fuel cycle without reprocessing is the current practice.

In 1977, DOE announced that the Federal Government would accept and take title to the SNF from U.S. commercial power reactors. This policy was designed to meet the needs of nuclear reactor licensees for both interim and permanent disposition of SNF (NRC 1979). DOE was mandated by the Nuclear Waste Policy Act of 1982 (NWPA) to begin disposing of commercial SNF at a permanent underground repository by January 31, 1998. To fund the program, nuclear power generating companies were required to pay a fee, proportional to the amount of power (in kilowatt-hours) they generated, into the nuclear waste fund (Holt 1998).

Both the original NWPA and the Nuclear Waste Policy Act Amendment of 1987 (NWPAA) included provisions for centralized interim storage as a component of the national program. The original Act called for DOE to provide long term interim storage until a permanent repository became available. The long term interim storage facility, a monitored retrievable storage facility (MRS), was to be located in any state other than the state in which the permanent geological repository would be located. The NWPAA created the position of Nuclear Waste Negotiator (NWN), who was assigned the task of finding a host site for a MRS. Several Federally Recognized Indian Tribes (including, for example, the Skull Valley Band) and other units of government expressed interest in hosting the MRS. However, the MRS program expired in 1994 without an MRS host being identified.

A permanent geological repository is now projected to be completed by DOE and could begin receiving commercial reactor SNF by 2010 (DOE 1999). Before a permanent repository becomes available, however, several nuclear power generating companies anticipate that their on-site SNF pool storage capacity may become inadequate. As a result, these companies see an interim facility as a viable solution to their SNF storage concerns.

To date, nuclear power reactor licensees have been coping with the SNF storage problem primarily by employing two methods to increase on-site SNF storage capacity: (1) expanding the capacity of spent fuel pools to store SNF and (2) constructing ISFSIs at the reactor site (also called "at-reactor" ISFSIs). Spent fuel pool storage capacity may be expanded by adding new fuel storage racks or by replacing the existing racks with new ones designed for closer spacing of fuel assemblies, thus allowing more fuel assemblies to be stored in the pool. Although many U.S. nuclear power plants, including most of the plants owned by the PFS member utilities, have already expanded the capacity of their spent fuel pools to store SNF, several are still running out of storage space. In fact, many reactor fuel pools are already at capacity, and it is projected that 80 percent of U.S. reactors will lose full core offload

[1]Reprocessing is a chemical operation in which residual uranium and plutonium in SNF are separated from radioactive wastes (fission products) produced during reactor operation. The residual uranium and plutonium are then purified and reused.

[2]The reprocessing of commercial nuclear fuel did occur at a facility in West Valley, New York, from 1966 to 1972.

capability by 2010 (see Figure 1.4). Full core offload capability refers to a power plant's capability to remove all fuel from the reactor vessel and store it in the spent fuel pool. Table 1.1 lists the remaining storage capacity for each plant owned by PFS members and the projected date when full core offload capability would be lost.

PFS estimates the total SNF to be shipped to the proposed PFSF under anticipated service contracts is greater than 15,500 MTU. PFS states that a 40,000 MTU facility would make additional SNF storage capacity available for SNF from other nuclear power plants that are projected to require additional storage capacity while operating and for acceptance of SNF from shutdown nuclear power plants.

Regulations have been established by NRC in 10 CFR Part 72 that allow for both at-reactor ISFSIs and off-site ISFSIs (also called "away-from-reactor" ISFSIs). Pursuant to Subtitle B of the NWPA, all licensees of nuclear power plants licensed under 10 CFR Part 50 have a general license for at-reactor dry cask storage at an on-site ISFSI. A nuclear power generating company exercising its general license may select a storage cask system approved by NRC and listed in 10 CFR Part 72, Subpart K. A reactor licensee must maintain its Part 50 license in order to maintain its general license for dry cask storage.

Nuclear power generating companies may also apply for a site-specific ISFSI license under 10 CFR Part 72. An application for a site-specific license must specify the storage cask(s) that the utility plans to use. A site-specific license can be for at-reactor or away-from reactor storage. Companies storing spent fuel under site-specific licenses are not necessarily required to maintain Part 50 licenses to do so.

As of October 2001, there were 20 ISFSIs operating in the United States (see Figure 1.5), and approximately 20 additional ISFSIs are either proposed or being considered for the near term. Of the 20 operating ISFSIs, two (Prairie Island, Hatch) are owned by PFS members. All operating ISFSIs in Figure 1.5 are located at licensed reactor sites except GE-Morris and the DOE facilities at Fort St. Vrain and the Idaho National Engineering and Environmental Laboratory.

While many reactor licensees are building at-reactor ISFSIs, PFS has identified three primary reasons why an away-from-reactor ISFSI is needed. First, PFS indicated that political or physical constraints at some reactor sites could prevent expanding on site storage. At least one PFS member has physical site limitations that would prevent building or expanding an at-reactor ISFSI. For this reactor, an away-from-reactor ISFSI would provide an SNF storage option. Absent such an option, this reactor would have to shut down once it reaches its SNF storage capacity, which might occur prior to the end of its current operating license. PFS also stated that some reactor sites are subject to state legislation or local restrictions or processes that could restrict or prohibit storage expansions. In addition, PFS states that state legislation or state regulatory decisions have imposed very costly and burdensome restrictions or limitations on storage expansions, raising the risk that future expansions may be restricted, delayed, limited, or prohibited; for example, the State of Minnesota has imposed restrictions on further expansion of SNF storage capability at the Prairie Island reactor site. PFS has stated that other facilities that have not added dry storage and have exhausted in-pool storage expansion alternatives may experience either political or physical site constraints in the future that could prohibit dry storage and thus require shutdown of the nuclear power plant.

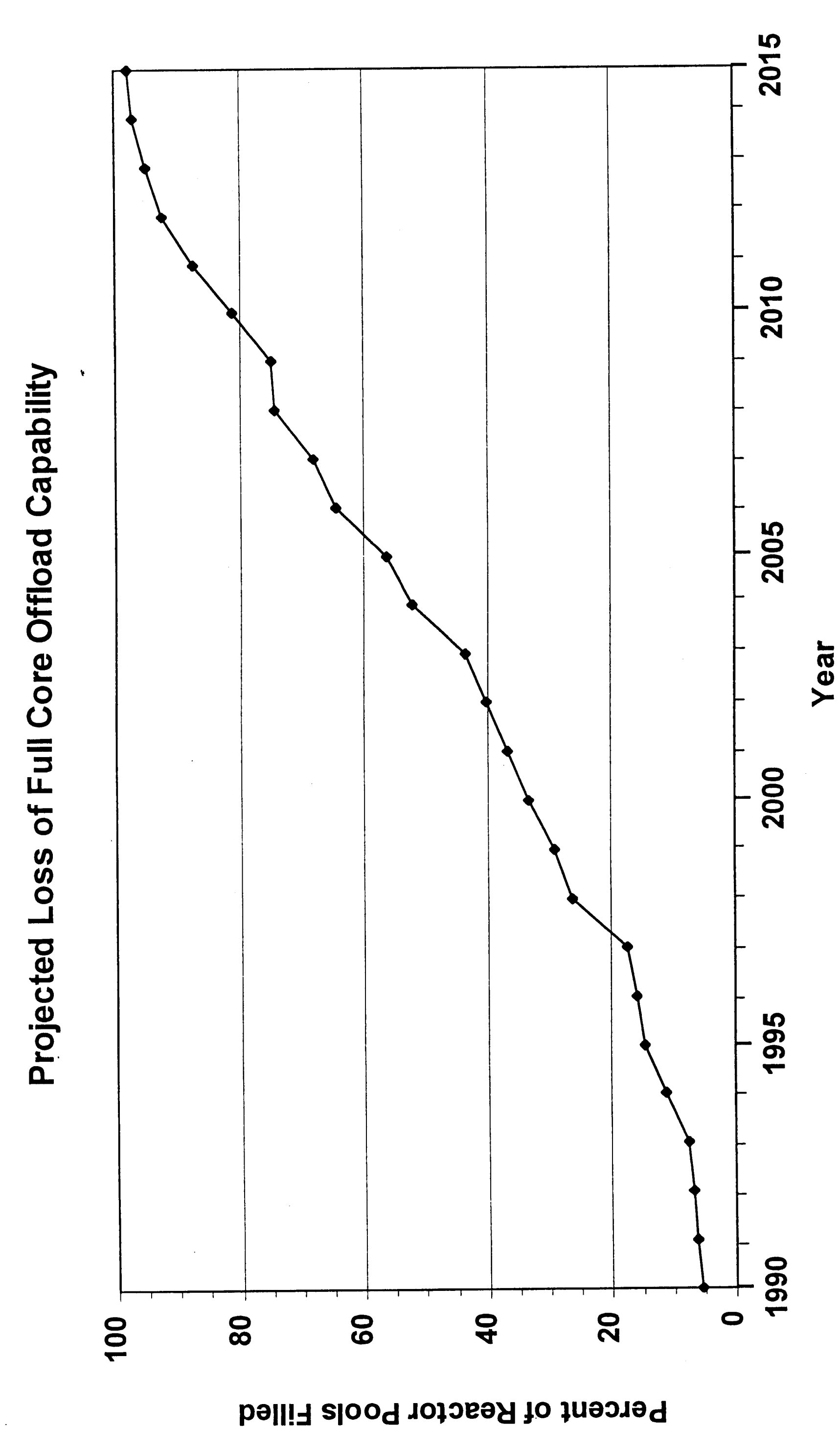

Figure 1.4. Projected loss of full core offload capability for U.S. commercial nuclear reactors. *Sources:* Energy Resources International and DOE/RW-0431, Rev. 1.

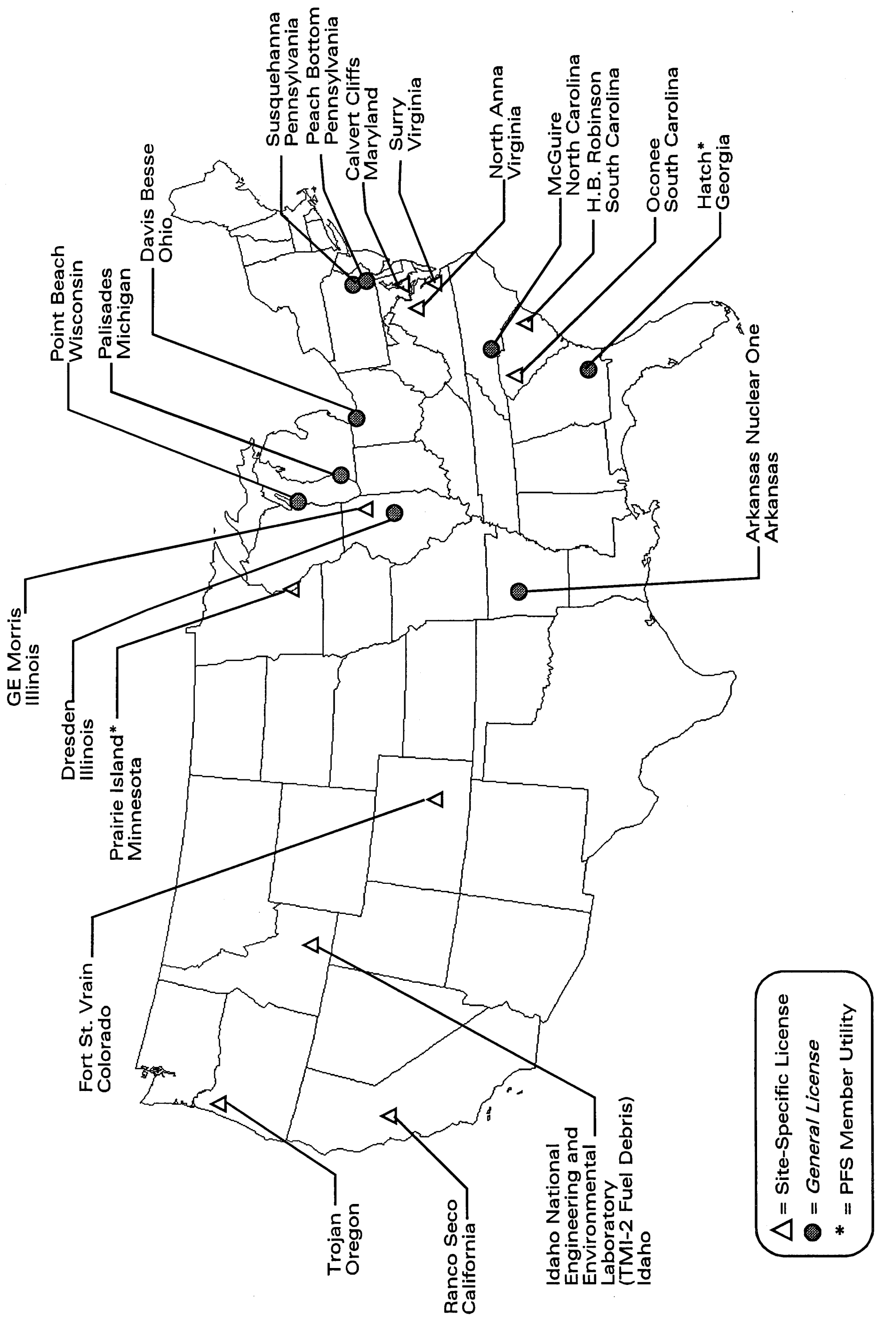

Figure 1.5. Operating spent fuel storage sites (i.e., ISFSIs) as of October 2001.

Table 1.1. Site-specific reactor information for PFS member utilities

Utility	Reactor[a]	Remaining storage capacity (no. spaces)	Projected date of loss of full-core offload capability
Entergy Corporation	Indian Point Unit 1	Shutdown; fuel onsite	N/A (shutdown)
	Indian Point Unit 2	385	2004
Southern California Edison Co.	San Onofre Unit 1	Shutdown; fuel onsite[b]	N/A (shutdown)
	San Onofre Unit 2	480	2006
	San Onofre Unit 3	524	2006
Genoa FuelTech, Inc.	La Crosse Boiling Water Reactor	Shutdown; fuel onsite	N/A (shutdown)
Indiana-Michigan Company (American Electric Power)	D.C. Cook Units 1 and 2	1,553 (shared)	2010 (both units)
Florida Power and Light Co.	St. Lucie Unit 1	483	2005
	St. Lucie Unit 2	528	2007
	Turkey Point Unit 3	520	2010
	Turkey Point Unit 4	501	2011
GPU Nuclear Corporation (not planning on using proposed PFSF for storage)	None	N/A	N/A
Xcel Energy, Inc.	Monticello	971	2006
	Prairie Island Units 1 and 2	140 (shared)	2007 (both units)
Southern Nuclear Operating Co.	Farley Unit 1	376	2006
	Farley Unit 2	560	2008
	Hatch Units 1 and 2	859 (shared)	*N/A*[c]
	Vogtle Units 1 and 2	2,066 (shared)	2014 (both units)

[a]See Figure 1.3 for reactor locations.

[b]Pool is full; additional Unit 1 assemblies are being stored on an interim basis in Units 2 and 3 pools and in space leased at the General Electric Morris Facility through 2002.

[c]Southern Nuclear Operating Co. has obtained a license for an ISFSI to store spent fuel from Hatch Units 1 and 2, and has transferred some spent fuel from the Hatch reactors' fuel pool out to the dry storage facility where the fuel is stored in storage casks. As a result of this on-site dry storage capability, full-core offload capability is planned to be maintained at all times for Hatch Units 1 and 2, so there is no projected date for loss of full-core offload capability.

Source: PFS/ER 2001; information and data are current as of November 2000.

Second, an away-from-reactor ISFSI could afford nuclear power generating companies with reactors that are already shutdown the ability to fully decommission their sites sooner. PFS indicated that some of its members currently hold licenses for reactors that are already shutdown and that the licenses for 20 of the PFS members' units will expire before the DOE permanent geological repository can accept all the accumulated fuel from the individual sites. An away-from-reactor ISFSI would provide an off-site facility for the storage of SNF, thereby potentially reducing the amount of time a reactor licensee would need to maintain a shut down reactor site. Until all SNF has been removed, the site cannot be fully decommissioned, and a reactor owner would continue to incur the cost of maintaining the reactor site.

Third, PFS has indicated that a centralized away-from-reactor ISFSI would reduce the cost of SNF storage. Due to economies of scale, spent fuel storage at a centralized storage facility is projected to be more cost effective than long-term storage of SNF at nuclear power plant sites until a DOE permanent geological repository is available. PFS indicated that its members decided to proceed with the project based on these financial projections, since the proposed PFSF would provide a lower cost SNF storage alternative than other options that are available. Although additional nuclear power generating companies have not joined PFS to date, PFS maintains that additional companies would likely utilize the proposed PFSF instead of building additional at-reactor storage capacity or continuing to store SNF at shutdown nuclear power plant sites because it would be a cost effective alternative.

1.4 Scoping Process

1.4.1 Scoping for the Draft EIS

The scoping process was initiated on May 1, 1998, with the publication of a Notice of Intent (NOI) to prepare an EIS and conduct the scoping process (63 Fed. Reg. 24197). As described in the NOI, the objectives of the scoping process were to

- define the scope of the proposed action that is to be the subject of the EIS;
- determine the scope of the EIS and identify significant issues to be analyzed in depth;
- identify and eliminate from detailed study issues that are peripheral or are not significant;
- identify any environmental assessments and other EISs that are being or will be prepared that are related to but are not part of the scope of the EIS under consideration;
- identify other environmental review and consultation requirements related to the proposed action;
- indicate the relationship between the timing of the environmental analyses and the Commission's tentative planning and decision-making schedule;
- identify any Cooperating Agencies and, as appropriate, allocate assignments for preparation and schedules for completion of the EIS to the NRC and any Cooperating Agencies; and
- describe the means by which the EIS will be prepared, including any contractor assistance to be used.

A scoping meeting was held in Salt Lake City, Utah, on June 2, 1998. Thirty-five people offered comments at the meeting, including the Governor of Utah (via videotape), a member of the U.S. Congress, representatives from Federal and State of Utah agencies, and Federally Recognized Indian Tribes. During the scoping meeting, PFS presented a briefing on the proposed action and the NRC staff summarized the environmental review process and the proposed scope of the EIS. Comments and suggestions from the audience were received and are summarized in the scoping report (NRC

1998) (see Appendix A). During the remainder of the scoping period, NRC received 30 comment letters, which are also summarized in the scoping report.

Two additional scoping meetings were held on April 29, 1999, to address the PFS proposal to construct a new rail line down the western side of Skull Valley and the required plan amendment to the Pony Express Resource Management Plan (RMP), and to address any environmental concerns associated with the lease agreement that might not have been discussed at the previous scoping meeting. The notice for these meetings was published in the *Federal Register* on April 14, 1999, (64 Fed. Reg. 18451). One meeting was held in Salt Lake City and the other in Tooele, Utah. After presentations were made by BIA, BLM, and the NRC, oral comments were provided by representatives of a member of the U.S. Congress, Utah State departments or agencies, a Federally Recognized Indian Tribe, private organizations, and interested members of the public. Written comments were also received (see Appendix A).

The comments provided by the State of Utah and other interested members of the public, which represent the major points of view on the proposed action, identified a number of environmental concerns. These concerns were summarized in the original scoping report and the supplemental scoping report and were considered in determining the scope of this EIS (see Appendix A).

On the basis of the scoping process and the requirements of NEPA and 10 CFR Part 51, the Cooperating Federal Agencies determined that this EIS would address the potential environmental impacts of constructing and operating the proposed PFSF and related transportation facilities for the following issues:

- ***Radiological impacts and human health and safety.*** The potential public health consequences of the proposed action are evaluated with emphasis on radiological exposure risk during normal operations, including transport of the SNF (including handling, transfer, and inspection activities) and under credible accident scenarios. Nonradiological events and activities with potential human health impacts are also identified and evaluated.
- ***Cumulative impacts.*** The FEIS analyzes the potential cumulative impacts, if any, of the proposed PFSF in the context of other existing and proposed facilities and activities in the area of the proposed project area, which includes the site, the rail line, and the intermodal transfer facility (ITF; as described in Section 2.2.4.2), as appropriate.
- ***Socioeconomics.*** The socioeconomic issues that fall within the scope of the FEIS include the direct and indirect economic effects (both beneficial and adverse) on employment, taxes, residential and commercial development, agriculture, and public services in the area. The effects of the proposed action on land use in the area, including use of public lands, tribal trust lands, and rights-of-way, are assessed in the FEIS. The FEIS also includes an evaluation of the extent to which lands and land use may be disturbed or altered during construction and operation of all portions of the proposed action. In addition, recreational and tourism sites, wilderness areas, and aesthetic values of the area are analyzed.
- ***Cultural resources.*** The FEIS assesses potential impacts of the proposed action on the historic and archaeological resources of the area and on the cultural traditions and lifestyle of Native Americans. The FEIS also discusses the consultation process on historic properties required by the National Historic Preservation Act of 1966, as amended.
- ***Environmental Justice.*** Environmental justice issues are addressed in the FEIS as directed by Executive Order 12898. The environmental justice review includes an analysis of the human health and environmental impacts on low-income and minority populations resulting from the proposed action and its alternatives. The Cooperating Agencies used demographic data to

identify the minority and low-income groups within the area and determine if the impacts disproportionately affected these groups.

- ***Geology and seismicity.*** The FEIS describes the geologic and seismic characteristics of the proposed site and evaluates the impacts of construction and operation of the proposed action on the site's geology and soils. Evaluation of the potential for earthquakes, ground motion, soil stability concerns, surface rupturing, and any other major geologic or seismic considerations that would affect the suitability of the proposed site as a storage location for SNF are addressed in the NRC's Safety Evaluation Report (SER), as updated, (see Section 1.5.1) rather than the FEIS; the SER also addresses cask design, particularly in the context of potential seismic events. A summary of the NRC's evaluation findings is provided in this Final EIS.
- ***Transportation.*** The analysis of potential impacts resulting from the transportation of SNF considers relevant aspects of both rail and truck transport to the proposed PFSF. The FEIS discusses the number, type, and frequency of shipments, as well as routing considerations and the quantities of SNF being shipped. The impacts of transportation are evaluated primarily in terms of radiological exposure risk during normal transportation (including handling, transfer, and inspection) and under credible accident scenarios. The non-radiological impacts of transportation are also identified and evaluated. Construction and maintenance activities required for rail or road systems are assessed, including input from BIA and BLM.
- ***Accidents.*** NRC safety regulations and guidance specify that the facility be designed to withstand various credible accidents, including natural events, without having a significant radiological release. The SER includes an evaluation and determination on (1) the adequacy of the design to withstand credible accidents, (2) the potential for a radiological release to occur as a result of any such accident, and (3) the significance of any such radiological release. The FEIS analyzes the potential environmental impacts resulting from credible accidents at the proposed facility.
- ***Compliance with applicable regulations.*** The FEIS presents a partial listing of the relevant permits and regulations that have been identified as potentially applicable to the proposed PFSF. Regulatory or legal issues covered in the FEIS include water rights, land use restrictions such as rights-of-way, and oil, gas, or mineral leases that would interfere with the availability or suitability of the proposed site.
- ***Air quality.*** Potential air quality impacts of the proposed project are evaluated in the FEIS. The evaluation includes potential impacts resulting from construction activities and operation and compares the anticipated air quality impacts, if any, with relevant standards. Appropriate modeling is performed to assist in the analysis of potential air quality impacts.
- ***Hydrology.*** The FEIS assesses the potential impacts of the proposed project on surface water and groundwater resources. The assessment considers water resources, water quality, water use, floodplains, and the probable maximum flood (PMF), which is evaluated in the NRC SER, as updated.
- ***Ecological resources.*** The FEIS assesses the potential environmental impacts of the proposed action on ecological resources, including plant and animal species and threatened or endangered species or critical habitat that may occur in the area. As appropriate, the assessment includes potential effects on wildlife migration patterns, and mitigation measures to address adverse impacts are analyzed. The FEIS also discusses the consultation process required by the Endangered Species Act of 1973, as amended.
- ***Need for the facility.*** A discussion of the need for the proposed PFSF and the expected benefits is presented in the FEIS and includes an estimate of the amounts of SNF generated by participating nuclear power plant licensees and their capabilities to store that fuel.
- ***Decommissioning.*** The FEIS includes a general discussion of the impacts associated with decommissioning of the proposed PFSF and related transportation facilities.

- ***Alternatives.*** The no-action alternative and other reasonable alternatives to the proposed action, such as alternative sites or alternative storage methods, are described and assessed in the FEIS.

In addition to the above items, issues identified by BLM for the proposed rail access corridor and discussed in this FEIS include fire, range land health, livestock management, noxious weeds, wildlife, wild horses, wetlands, historic trails, and access.

1.4.2 Comments on the Draft EIS

A Draft EIS was issued for public review and comment on June 23, 2000 (see 65 Fed. Reg. 39206). A 90-day public comment period began at that time. During the public comment period, a series of public meetings were held in the Salt Lake City area. Public meetings were held in Salt Lake City and Grantsville, Utah, on July 27 and July 28, 2000, respectively. In response to public requests, two additional public meetings were held in Salt Lake City on August 21, 2000 (see 65 Fed. Reg. 49029).

Appendix H contains the written comments received during the public comment period, and includes transcripts documenting the comments received at the aforementioned public meetings. In addition to the issues identified during the scoping process for the DEIS (see Section 1.4.1), the comments received during the public comment period identified concerns about potential impacts to military operations in Utah, accidents and risks, the seismic design of the proposed PFSF, and transportation risks and impacts. As discussed in Section 1.5.1, issues such as accidents and seismicity that are related to the safety of the facility are addressed in the NRC's Safety Evaluation Report (SER), as updated, the findings of which are summarized in Section 4.7.2.3. Appendix G sets forth the responses to the comments received on the DEIS within the comment period.

1.5 Cooperating Agencies

For the proposed PFSF in Skull Valley to be constructed and operate, the NRC, BIA, BLM, and STB must all approve certain aspects of the proposed action. Because each agency must take an action and because those actions are interrelated, the NRC, BIA, BLM, and STB have agreed to cooperate in the preparation of a single EIS.

The NRC is the lead agency in the preparation of this EIS. The preparation of a single EIS results in more efficient use of Federal resources. Each agency's action is described in the following paragraphs.

1.5.1 NRC Federal Action

On June 20, 1997, PFS applied to the NRC for a license to receive, transfer, and possess SNF and operate an ISFSI in the northwest corner of the Reservation. The initial period of the license would be for 20 years, and PFS indicated it may seek to renew the license for an additional 20 years. The NRC's decision-making process includes an environmental review (i.e., this FEIS) and safety review (see the discussion in the dialogue box) of the construction and operation of the proposed PFSF at the proposed site. Upon completion of both reviews, the NRC will decide whether to grant a license, with or without conditions, or deny the PFS request. Pursuant to 10 CFR 51.102(c), when a hearing is held on a proposed action, the initial decision of the presiding officer or the final decision of the Commissioners acting as a collegial body will constitute the Record of Decision (ROD).

The NRC safety regulations for an ISFSI are delineated in 10 CFR Part 72. Compliance with these regulations will provide reasonable assurance that the design and operation of an ISFSI will provide adequate protection of the public health and safety. NRC regulations for NEPA compliance are set forth in 10 CFR Part 51. Consistent with NEPA, NRC regulations require that an EIS be completed for major Federal actions significantly affecting the quality of the human environment. The Commission has determined that the licensing of an away-from-reactor ISFSI requires the preparation of an EIS.

BACKGROUND INFORMATION ON NRC's SAFETY REVIEW PROCESS

The NRC safety review of an ISFSI includes the preparation of a detailed report published asa Safety Evaluation Report (SER). The SER is based, in part, upon the Safety Analysis Report submitted by the applicant. The SER also includes the NRC's review of technical issues such as the adequacy of the facility design to withstand external events (i.e., earthquakes, floods, and tornadoes); radiological safety of facility operation, including doses from normal operations and accidents; emergency response plans; physical security of the facility; fire protection; maintenance and operating procedures; and decommissioning. The SER is a public document.

In addition to an SER for the ISFSI, NRC regulations require that an ISFSI use only storage and transportation cask designs that are licensed for use at the ISFSI and/or certified pursuant to 10 CFR Parts 72 and 71, respectively. For a cask design to be certified, the NRC must first complete a detailed review against the requirements of either 10 CFR Part 72 (for storage casks) or 10 CFR Part 71 (for transportation casks), or both for a dual-purpose shipping/storage cask. An SER would be completed for each cask and would describe the NRC's review of the adequacy of the cask design for technical issues such as the cask's ability to withstand external events (such as fires) and radiological impacts from normal use and accidents.

1.5.2 BIA Federal Action

A conditional lease between PFS and the Skull Valley Band was executed on May 23, 1997. PFS and the Skull Valley Band propose to enter into a lease for the site for 25 years, with an irrevocable option for an additional 25 years. The proposed lease would allow for the use of approximately 330 ha (820 acres) of land in the northwest corner of the Reservation for the proposed PFSF and 82 ha (202 acres) of land for a utility and road access corridor across tribal trust land, which includes rights-of-way for water pipelines, as well as for a buffer zone around the proposed PFSF. Only land uses currently existing on the buffer zone would be permitted unless consent is given by both parties. 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.

A determination to approve or disapprove the lease is made on a two-tiered decision process. The first tier is to determine whether the lease meets regulatory requirements for lease of tribal trust lands set forth in 25 CFR Part 162. The second tier of the decision process is documentation of NEPA compliance. After completing its regulatory review, including this FEIS, BIA will issue a ROD. The lease will not be approved or disapproved until the EIS is completed, commitments to mitigation measures identified in the BIA ROD are made, and the NRC issues a license to PFS.

Because of BIA's unique role in approving or disapproving the proposed lease, the purpose and need for its action differ from those of the NRC. The purpose of BIA's action is to promote the economic development objectives of the Skull Valley Band. The need for BIA's action is its government-to-government relationship with, and trust responsibility (including consideration of environmental impacts) to the Skull Valley Band. This difference has ramifications for the scope of BIA's NEPA review and the range of the BIA's reasonable alternatives. As part of its government-to-government relationship with the Skull Valley Band, BIA's NEPA review is limited to the scope of the proposed lease negotiated between the parties, not evaluation of actions outside the lease (e.g., ultimate disposition of the SNF). Similarly, the range of BIA's reasonable alternatives is limited to those that will serve the Skull Valley Band's economic development, consistent with the BIA's trust responsibility [i.e., the approval of the proposed PFSF site location(s) on the Reservation, or no action—disapproval of the lease]. PFS has identified an alternative site location on the Reservation (see Section 2.2.3). If BIA identifies this alternative site as the preferred alternative, it would require the Skull Valley Band and PFS to amend the proposed lease.

1.5.3 BLM Federal Action

1.5.3.1 Rights-of-Way and Resource Management Planning

By letter dated August 28, 1998, PFS applied to BLM for separate rights-of-way to provide transportation routes from the Interstate 80 corridor to the proposed PFSF site on the Reservation. The applicant's preferred route is a rail line from Skunk Ridge along the base of the Cedar Mountains on the western side of Skull Valley, then east to the proposed site (Figure 1.2). The alternative transportation mode is an ITF located 2.9 km (1.8 miles) west of the intersection of I-80 and Skull Valley Road (see Section 2.2.4.2). At the ITF, SNF would be transferred from railcars to heavy-haul vehicles and transported to the proposed PFSF via the Skull Valley Road.

The location of either the rail corridor or the ITF would occupy public land that is included within the BLM Pony Express resource management plan (RMP). The decisions in the current RMP do not provide for a major right-of-way, such as a rail line, along the west side of Skull Valley. The PFS proposal would, therefore, require an amendment to the RMP, *Transportation and Utility Corridor Decision 1*, prior to BLM granting the rail line right-of-way. The amendment would add an exception to the resource management plan decision to allow the construction and use of the proposed rail line outside the established corridors. This FEIS will serve as the NEPA document for BLM's determinations with respect to granting a right-of-way and the proposed plan amendment, should BLM approve the rail line right-of-way.

The following planning criteria have been established by BLM to guide the development of the amendment to the Pony Express RMP:

- The Plan will address only BLM lands administered by the Salt Lake Field Office and will not address private lands or lands administered by other government agencies.
- Coordination and cooperation across interagency administrative boundaries will take place in both planning and implementation.
- The public will have an opportunity to provide information and recommendations on the proposal and to review and comment on the proposed action before a final management decision.
- Social and economic impacts to local communities resulting from public land management will be considered.

BLM's action—dependent on NRC issuing a license and BIA approving a lease—is to issue a right-of-way grant under 43 CFR Part 2800 for the rail line, or for the ITF, or to deny both applications. If the rail line alternative is selected, BLM would require resolution of a planning restriction imposed by

Section 2815 of the National Defense Authorization Act for Fiscal Year 2000, and completion of the plan amendment process in accordance with 43 CFR Part 1600, prior to issuance of the right-of-way grant. BLM's review of the proposal will consider both technical and environmental issues. After completing its review, BLM will issue a ROD. The BLM also requires that certain "Critical Elements" be considered in this FEIS. Table 1.2 identifies these critical elements; those elements that have been found to have no effect are not further discussed in this FEIS and the rationale for their disposition is provided in Table 1.2.

1.5.3.2 Planning Consistency

The Federal Land Policy and Management Act (FLPMA), Title II, Section 202, provides guidance for the land use planning system of the BLM to coordinate planning efforts with Federally Recognized Indian Tribes, other Federal departments, and agencies of state and local governments. To accomplish this directive, Section 202 directs the BLM to keep apprized of state, local, and tribal plans; assure that consideration is given to those plans which are relevant; and assist in resolving, to the extent practical, inconsistencies between Federal and non-Federal government plans. The FLPMA goes on to state in Subsection (c) (9) that *"Land use plans of the Secretary under this section shall be consistent with State and local plans to the maximum extent he finds consistent with Federal law and the purposes of this Act."* The provisions of this section of the FLPMA are echoed in 43 CFR 1610.3, BLM Resource Management Planning regulations.

Other Federal plans reviewed included the DOE's 1992 Western Regional Corridor Study. The study identified a route along the west side of Skull Valley for a transmission corridor. The suggested corridor is located in the same vicinity as the proposed rail line. It is important to note that the study is not a decision document, rather it is a document which the BLM committed to use as a reference when considering land use decisions.

Additionally, the Tooele County General Plan has been reviewed and found consistent with the land use plans of the proposed project. In a letter dated September 18, 2000, the Tooele County Commission stated its support for the proposed action. The General Council and the Executive Committee of the Skull Valley Band has approved the proposed action.

The proposed plan amendment is not known to be inconsistent with state resource plans. There may be inconsistencies, however, with State law regarding the transport or storage of high level nuclear waste.

1.5.4 STB Federal Action

The STB has regulatory authority over the construction and operation of new rail lines in the United States. The STB would have to grant a license for the construction and operation of PFS's proposed rail line from Skunk Ridge. On January 5, 2000, PFS filed an application with STB for the proposed rail line construction and operation (Finance Docket 33824, *Great Salt Lake and Southern Railroad, L.L.C.–Construction and Operation in Tooele County, Utah*). STB will take its action considering both the merits of the proposal and the potential environmental impacts. STB will prepare a ROD providing the basis for its decision to either grant or deny the PFS application with appropriate conditions, including environmental conditions.

Table 1.2. Critical elements identified by BLM and considered in this FEIS

Indirect/direct cumulative effect	No effect	Value	Rationale for BLM's determination of "no effect"
X		Air quality	
X		Threatened and endangered species	
X		Flood plains	
	X	Prime/unique farmland	There are no prime/unique farmlands present in this area.
X		Cultural/historical resources	
	X	Paleontological	No surveys have been performed in this area, and the authorized BLM officer is not aware of any paleontological resources that would be affected by the proposed action.
X		Wilderness	
X		Water resources	
	X	Areas of critical environmental concern (ACEC)	There are no ACECs in western Skull Valley.
	X	Wild & scenic rivers	There are no rivers or creeks in the Cedar Mountains suitable for wild and scenic designation.
X		Native American concerns	
X		Wastes, hazardous/ solid	
X		Environmental justice	
	X	Riparian	There are no riparian areas that would be crossed by the proposed rail corridor. Travel along the existing Skull Valley highway would not directly affect riparian areas
X		Noxious weeds	

1.5.5 Required Agency Consultation

The Cooperating Federal Agencies, NRC, BIA, BLM, and STB, are required to comply with the Endangered Species Act of 1973, as amended, and the National Historic Preservation Act of 1966 (NHPA), as amended.

1.5.5.1 Endangered Species Act Consultation

The Cooperating Federal Agencies have consulted with the U.S. Fish and Wildlife Service (FWS) to comply with the requirements of Section 7 of the Endangered Species Act of 1973 (see Appendix B). On June 14, 1999, the Cooperating Federal Agencies sent a letter to the FWS's Utah Field Office describing the proposed action and requesting a list of threatened and endangered species and critical habitats that could potentially be affected by the proposed action. By letter dated June 22, 1999, the FWS's Utah Field Office provided a list of threatened, endangered, and conservation agreement species. By letter dated June 16, 2000, the Cooperating Federal Agencies requested that the FWS concur in the agencies' finding that the proposed action will not adversely effect any listed threatened or endangered species. By letter dated June 30, 2000, the FWS concurred with the Cooperating Agencies' no adverse effect determination. Prior to the construction of the proposed facility, the list of threatened and endangered species will be updated and additional surveys will be conducted in accordance with the update.

1.5.5.2 National Historic Preservation Act (NHPA) Section 106 Consultation

The Cooperating Federal Agencies have offered State agencies, Federally Recognized Indian Tribes and other organizations that may be concerned with the possible effects of the proposed action on historic properties, an opportunity to participate in the consultation process required by Section 106 of the NHPA (see Appendix B). The following is a list of agencies, tribes, and organizations contacted during the consultation process:

A. Utah State Historic Preservation Officer (SHPO)

By letter dated May 18, 1999, the Cooperating Federal Agencies initiated the Section 106 process with the Utah State Historic Preservation Officer (SHPO). This letter described the potentially affected area and requested the views of the SHPO on further actions to identify historic properties that may be affected. The Utah SHPO responded by letter dated June 24, 1999. The Utah SHPO identified three additional actions it thought the Cooperating Federal Agencies should take in their effort to identify historic properties that may be affected by the proposed action (see Appendix B).

Subsequent to the Cooperating Federal Agencies letter of May 18, 1999, revised regulations, as issued by the Advisory Council on Historic Preservation (Council), became effective. As a result, the Cooperating Federal Agencies recommended in a letter dated November 9, 1999, that the new regulations be implemented for this Section 106 consultation process. In a letter dated November 23, 1999, the Utah SHPO agreed to proceed with the consultation pursuant to the revised regulations.

Subsequent to this, the Utah SHPO appeared to cease active participation in the process. On October 10, 2000, the Utah SHPO declined to meet with the Cooperating Federal Agencies to discuss eligibility recommendations for potentially historically significant sites within the Area of Potential Effect (APE), and to discuss possible mitigation measures to minimize or eliminate any adverse effect. He referred the agencies to the Utah Governor's office. By letter dated October 19, 2000, the Cooperating Federal Agencies requested a clarification of the Utah SHPO's role in the consultation process. In the letter, the Cooperating Federal Agencies stated that failure to respond to the letter would be interpreted as a withdrawal from the consultation process. By letter dated November 1, 2000, the Governor of Utah, Michael O. Leavitt, informed the NRC that he retained the authority of the Utah SHPO and designated the Governor's State Planning Coordinator as the State's representative for the consultation process. By letters dated December 5, 2000, to the Governor and Governor's State Planning Coordinator, the Cooperating Federal Agencies acknowledged the reassignment of the SHPO's responsibilities within the Utah Governor's Office. The Cooperating Agencies have communicated with the Utah Governor's office to continue the consultation process.

B. Federally Recognized Indian Tribes

In response to the Utah SHPO's letter dated June 24, 1999, BLM (by letters dated July 1, 1999, and December 28, 1999) and NRC (by letter dated April 26, 2000) contacted regional Federally Recognized Indian Tribes soliciting their interest in being consulting parties in the Section 106 consultation process for the proposed project. By letter dated July 9, 1999, the Confederated Tribes of the Goshute Reservation informed BLM of their interest in participating in the consultation process. No other Federally Recognized Indian Tribes responded initially.

During follow-up calls, the Northwestern Band of Shoshoni Nation (on September 27, 2000) and the Northern Ute Indian Tribe (on January 3, 2001) declined to participate in the consultation process and indicated that neither were aware of properties of traditional and cultural significance within the APE. The Te-Moak Tribes of Western Shoshone Indians of Nevada, during a follow-up call on September 27, 2000, indicated they would like to participate in the consultation process. The Paiute Indian Tribe of Utah, on October 25, 2000, (and December 6, 2000, at the Tribal Council monthly meeting), informed the Cooperating Federal Agencies that the Tribe declined to be a consulting party but would like to be kept informed of the project. By letter dated October 16, 2000, the Cooperating Federal Agencies solicited concurrence from the interested Indian Tribes regarding eligibility determinations for archaeological and historic sites along the proposed rail line. Details of this consultation are presented in Appendix B.

C. Other Organizations

Additionally, in accordance with 36 CFR 800.3(f), the Cooperating Federal Agencies contacted local interested organizations, by letters dated December 28, 1999, April 26, 2000, and October 16, 2000, and by follow-up calls, soliciting their interest in being consulting parties in the Section 106 consultation process for the proposed project and their knowledge of cultural resources within the APE. By letter dated September 13, 2000, the Cooperating Federal Agencies also contacted Ohngo Gaudadeh Devia (OGD) to solicit information regarding cultural resources. The Utah Chapter of the Oregon-California Trail Association, the National Park Service (Long Distance Trails Office), member organizations of the Utah Historic Trails Consortium, and OGD informed BLM that they would like to participate in the consultation process. The National Railway Historical Society, Iosepa Historical Society, and U.S. Army Dugway Proving Ground indicated that they did not want to participate.

D. Advisory Council on Historic Preservation

By letter dated June 22, 2000, the Cooperating Federal Agencies notified the Council that the proposed action would result in an adverse effect on the Hastings Cutoff Trail, and other resources that have not been fully evaluated to determine their cultural significance. By letter dated June 28, 2000, the Council acknowledged notification and supporting documentation regarding the adverse effect of the project on properties eligible for inclusion in the *National Register of Historic Places (National Register)*. The Council informed the Cooperating Federal Agencies that based on the information provided, the Council's participation was not needed in the consultation process to resolve the adverse effects. Furthermore, the Council stated that pursuant to 36 CFR 800.6(b)(iv), the Cooperating Federal Agencies would need to file a final Memorandum of Agreement (Agreement), developed in consultation with the Utah SHPO, and related documentation at the conclusion of the consultation process, in accordance with Section 106 of the NHPA.

By letter dated November 27, 2000, the Cooperating Federal Agencies requested the Council's participation in the consultation process and in development of the Agreement based on the unique circumstances associated with the Utah Governor's participation in the consultation process. By letter dated December 18, 2000, the Council agreed to participate in the consultation process. By agreeing to participate in the consultation process, the Cooperating Federal Agencies consulted with the Council to seek ways to avoid, minimize or mitigate the adverse effects of the project, as described in the "Summary of Consultation Activities," below.

E. Summary of Consultation Activities

In May and June of 1999 and in June 2000, a PFS contractor, P-III Associates, performed a Class III cultural resources inventory in Skull Valley, Utah. All portions of the APE were included in the study area. BLM representatives met with representatives of the Lincoln Highway Association and its Utah Chapter on January 11, 2000, and with the Utah Historic Trails Consortium and its member organizations on April 27, 2000, to discuss preliminary results of the inventory. On January 11, the Utah Chapter of the Lincoln Highway Association expressed concern about possible impacts to the Victory Highway and U.S. Highway 40 in the Skunk Ridge siding area. During the April 27, 2000, meeting, a member of the Oregon California Trail Association stated that there were two historic trails in the southern part of the rail corridor and that these trails were being overlooked.

Additional information on these resources was collected during June 2000, enabling these concerns to be addressed. This information was included in the final report documenting the cultural resource inventory. Copies of the report were provided to the consulting parties including the Skull Valley Band, the Confederated Tribes of the Goshute Reservation, Paiute Indian Tribe of Utah, Te-Moak Tribes of Western Shoshone Indians of Nevada, OGD, and member organizations of the Utah Historic Trails Consortium. For all sites within the APE, the report includes a recommendation with regard to each site's eligibility for inclusion in the *National Register*. The Cooperating Federal Agencies reviewed the report and concurred with the eligibility determinations. By letter dated October 6, 2000, the Cooperating Federal Agencies requested the Utah SHPO's concurrence on the eligibility recommendations. By letter dated October 16, 2000, the Cooperating Federal Agencies requested concurrence on the eligibility recommendation from other consulting parties.

Additionally, on July 27, 2000, and during the week of October 23-27, 2000, the Cooperating Federal Agencies met with representatives of the consulting parties to discuss the eligibility recommendations included in the report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the APE. By letter dated October 31, 2000, the Lincoln Highway Association concurred with the eligibility determination. By letter dated October 25, the Utah Chapter of Lincoln Highway Association concurred with the eligibility determination. By letter dated November 10, 2000, the National Park Service (Long Distance Trails Office) concurred with the eligibility determinations. On November 14, 2000, the Confederated Tribes of the Goshute Reservation were contacted regarding the tribal elders' review of the project (see Appendix B). No properties of cultural and traditional significance to the Confederated Tribes of the Goshute Reservation within the APE were identified. The other consulting parties did not respond to the request for concurrence. Accordingly, concurrence with the eligibility determinations was presumed from the other consulting parties.

The details of a follow-up call with OGD are presented in Appendix B. The Cooperating Federal Agencies, after careful consideration of the information on cultural resources provided from OGD, determined that OGD would be granted consultation status. In addition, however, the Cooperating Federal Agencies determined that the substantive information OGD provided involved issues that were already being considered as a part of the Section 106 consultation process.

By letters dated December 1, 2000 and December 2, 2000, the Cooperating Federal Agencies requested concurrence on the determination of adverse effects on properties that were eligible for inclusion in the *National Register* from the other consulting parties. As a consequence of the finding of adverse effect, a draft Agreement was included with the letters. The Agreement outlines agreed-upon measures that PFS shall take to avoid, minimize, or mitigate these adverse effects. Additionally, the Agreement contains a commitment to develop a Treatment Plan that includes specific mitigation measures for cultural resources within the APE.

The Confederated Tribes of the Goshute Reservation declined concurrence by letter dated December 8, 2000. By letter dated December 14, 2000, the Lincoln Highway Association concurred with the determination of adverse effect. The Skull Valley Band concurred with the determination of adverse effects and commented on the draft Agreement by letter dated December 22, 2000. The National Park Service (Long Distance Trails Office) and the Utah Historic Trails Consortium also concurred and provided comments by letters dated December 18, 2000, and January 31, 2001, respectively. By letter dated February 8, 2001, the Cooperating Agencies extended the time to review the determination of adverse effects and the draft Agreement, based upon the requests of the member organizations of the Utah Historic Trails Consortium and the Council. The Council and PFS offered comments for consideration in finalizing the Agreement by letters dated February 15, 2001, and February 28, 2001, respectively.

Based on the comments received from the consulting parties, the draft Agreement was revised. By letter dated June 19, 2001, the Cooperating Federal Agencies requested comments on the revised draft Agreement. PFS, the National Park Service (Long Distance Trails Office), and the Council provided comments by letters dated June 28, 2001, July 5, 2001, and July 6, 2001, respectively. By letter dated June 29, 2001, the SHPO requested an extension of the review period and provided comments by letter dated August 6, 2001. Concurrence with the eligibility determinations was presumed from the other consulting parties. The Agreement will be finalized before the Cooperating Agencies issue their respective RODs.

A draft Treatment Plan reflects recommendations provided by the consulting parties to PFS by letter dated December 12, 2000. By letter dated April 20, 2001, the Council provided comments on the draft Treatment Plan. By letter dated March 19, 2001, the Cooperating Federal Agencies requested concurrence from the SHPO on the eligibility determination for the Rock Alignment and Cairn. No response was received and concurrence with the eligibility determination on the Rock Alignment and Cairn was therefore presumed from the SHPO.

1.6 Federal, Tribal, and State Authorities, Regulations, and Permits

This section describes the applicable Federal, Tribal, and State regulations governing the construction and operation of the proposed PFSF and transportation facilities with which PFS must comply. Section 1.6.1 identifies the potentially applicable statutes and regulations that require compliance, while Section 1.6.2 identifies the potentially required permits and provides the status of PFS's applications to obtain these permits. This information was obtained from the PFS's Environmental Report (PFS/ER 2001) and other sources (e.g., PFS/RAI2 1999a).

1.6.1 Statutes and Regulations

1.6.1.1 Federal Laws and Regulations

The proposed PFSF is subject to a number of Federal environmental laws, regulations, and other regulatory requirements: The following list identifies generally applicable laws and regulatory requirements:

- the Atomic Energy Act of 1954 as amended (42 USC 2011 *et seq.*), which gives NRC specific authority to regulate the possession, transfer, storage, and disposal of byproduct and special nuclear materials, as well as aspects of transportation packaging design requirements for these materials, including testing for packaging certification. Commission regulations applicable to the transportation of these materials (10 CFR Parts 71 and 73) require that shipping casks meet specified performance criteria under both normal transport and hypothetical accident conditions.
- NEPA (42 USC 4321 *et seq.*).
- CEQ's general regulations implementing NEPA (40 CFR Parts 1500–1508).
- NRC regulations implementing NEPA (10 CFR Part 51).
- the Resource Conservation and Recovery Act, as amended (RCRA; 42 USC 6901 *et seq.*), which governs treatment, storage, and disposal of solid waste.
- the Clean Air Act (CAA), as amended (CAA; 42 USC 7401 *et seq.*). The CAA requires (1) Federal agencies to comply with "all Federal, State, interstate, and local requirements" related to the control and abatement of air pollution; (2) the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS); and (3) establishment of national standards of performance for new or modified stationary sources of atmospheric pollutants. It further regulates emission of hazardous air pollutants, including radionuclides, through the National Emission Standards for Hazardous Air Pollutants Program (40 CFR Parts 61 and 63).
- the Clean Water Act (CWA) of 1977 (CWA; 33 USC 1251 *et seq.*), which generally requires (Section 113) all Federal departments and agencies to comply with Federal, State, interstate, and local requirements regarding discharge of pollutants to surface water bodies. Section 402(p) of the CWA (which was added to the CWA by the Water Quality Act of 1987) requires EPA to establish regulations for the Agency or individual states to issue permits for stormwater discharges associated with industrial activity, which includes construction activities that could disturb one or more acres.
- the Endangered Species Act (ESA), as amended (16 USC 1531 *et seq.*), which protects threatened and endangered species and their habitats from major adverse impacts. The ESA further requires consultation regarding these species with the FWS.
- The Bald and Golden Eagle Protection Act of 1940, as amended (16 USC 668-668d), which provides for the protection of the bald eagle and the golden eagle by prohibiting the taking, possession, and commerce of such birds, their nests, and their eggs. The Act prescribes criminal and civil penalties for persons violating the conventions identified in 16 USC 668.
- The Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712), which protects migratory birds included in the terms of the conventions identified in 16 USC 703.
- Executive Order 11514, *National Environmental Policy Act, Protection and Enhancement of Environmental Quality*. The Order directs Federal executive agencies to monitor and control their activities continually to protect and enhance the quality of the environment, and it requires the development of procedures both to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs with potential environmental impacts, and to obtain the views of interested parties.

- Executive Order 11593, *Protection and Enhancement of the Cultural Environment*, directs Federal executive agencies to locate, inventory, and nominate properties under their jurisdiction or control to the *National Register of Historic Places*.
- Executive Order 11988, *Floodplain Management*, directs Federal executive agencies to establish procedures to ensure that any Federal action undertaken in a floodplain considers the potential effects of flood hazards and floodplain management and avoids floodplain impacts to the extent practicable.
- Executive Order 11990, *Protection of Wetlands*; Federal executive agencies are directed to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.
- Executive Order 12088, *Federal Compliance with Pollution Control Standards*. The Order generally directs Federal executive agencies to comply with applicable administrative and procedural pollution control standards established in major Federal environmental legislation, such as the CAA, CWA, and Safe Drinking Water Act (SDWA).
- Executive Order 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*, which directs Federal executive agencies, to the extent practicable, to make the achievement of environmental justice part of their mission by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations in the United States, including Federally Recognized Indian Tribes.
- Executive Order 13007, *Indian Sacred Sites*, which directs Federal executive agencies to avoid adverse effects to sacred sites and to provide access to those sites to Native Americans for religious practices.
- Executive Order 13175 (as revised and updated November 6, 2000), *Consultation and Coordination with Indian Tribal Governments*. The Order directs Federal executive agencies to establish regular and meaningful consultation and collaboration with Tribal governments in the development of regulatory practices on Federal matters that significantly or uniquely affect their communities.
- Executive Order 13112—*Invasive Species*; Federal executive agencies, to the extent practicable and permitted by law, are required to, among other things, prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species, and develop technologies to prevent introduction and to provide for environmentally sound control of invasive species.
- the Federal Land Policy and Management Act of 1976 (43 USC 1701 *et seq.*), which governs the use of Federal lands administered by BLM. Title II and its implementing regulations in 43 CFR Part 1600 governs land use planning. Title V and its implementing regulations in 43 CFR Part 2800 governs rights-of-way that cross public land administered by the BLM.
- the National Historic Preservation Act (16 USC 470 *et seq.*) and related historic preservation laws [e.g., the Antiquities Act (16 USC 431 *et seq.)*] provide for the protection and preservation of cultural and historic resources.
- the American Indian Religious Freedom Act (42 USC 1996 *et seq.*)
- the Archaeological Resources Protection Act, as amended (16 USC 470aa *et seq.*) would apply if there were any excavation or removal of archaeological resources from publicly held or Indian trust lands.
- provisions of the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) would apply if there were any discoveries of Native American graves or grave artifacts.

- the Noise Control Act of 1972, as amended (42 USC 4901 *et seq.*) would apply to any noise-generating activities carried out during the construction, operation, or closure of the proposed facility.
- the Occupational Safety and Health Act (29 USC 651 *et seq.*) and its implementing regulations (29 CFR 1900 *et seq.*).
- NRC's regulations in 10 CFR Part 20, *Standards for Protection Against Radiation,* and in 10 CFR Part 72, *Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste*.
- the Pollution Prevention Act of 1990 (42 USC 13101 *et seq.*), which establishes a national policy for waste management and pollution control that focuses first on source reduction, and then on environmentally safe recycling, treatment, and disposal.
- the requirements for the Secretary of the Interior or a delegated representative to approve business leases with Federally Recognized Indian Tribes (25 U.S.C. 415 and implementing regulations in 25 CFR Part 162).
- the Safe Drinking Water Act (enforcement of drinking water standards has been delegated by EPA to the States; regulations are found at 40 CFR Parts 123, 141, 145, 147, and 149).

Cross-country and local transportation of SNF to the proposed PFSF site would require compliance with the NRC's regulations in 10 CFR Part 71, *Packaging and Transportation of Radioactive Material*. The regulations in 10 CFR Part 73, *Physical Protection of Plants and Materials* govern safeguards and physical security during the shipment of SNF. The transportation aspects of the proposed project would also require compliance with applicable Department of Transportation (DOT) regulations, such as those found in 49 CFR and its subchapters as listed below:

- Chapter I, Subchapter A: *Hazardous Materials Transportation, Oil Transportation, and Pipeline Safety*; Part 107, *Hazardous Materials Program Procedures;*
- Subchapter C: *Hazardous Materials Regulations*; Part 171, *General Information, Regulations, and Definitions*; Part 172, *Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements*; Part 173, *Shippers—General Requirements for Shipments and Packagings*, Subpart I, *Radioactive Materials*;
- Part 174, *Carriage by Rail;*
- Part 177, *Carriage by Public Highway*.

Also, the action would be required to comply with the DOT Federal Highway Administration regulations in 49 CFR Chapter III, Subchapter B: *Federal Motor Carrier Safety Regulations*; including:

- Part 390, *Federal Motor Carrier Safety Regulations, General*;
- Part 391, *Qualifications of Drivers*;
- Part 392, *Driving of Commercial Motor Vehicles*;
- Part 393, *Parts and Accessories Necessary for Safe Operation*;
- Part 395, *Hours of Service of Drivers*;
- Part 396, *Inspection, Repair, and Maintenance*; and
- Part 397, *Transportation of Hazardous Materials; Driving and Parking Rules*.

1.6.1.2 Skull Valley Band of Goshute Indians Tribal Statutes and Regulations

Activities that would occur on the Reservation would be required to comply with Tribal laws, regulations, and ordinances, including those Federal laws (e.g., CWA, Safe Drinking Water Act, and CAA) which allow a Tribe to be treated as a sovereign government or subfederal government.

1.6.1.3 State of Utah Statutes and Regulations

Those activities that would take place outside the Reservation (e.g., along the transportation corridor) would be required to comply with applicable Utah statutes and regulations in the Utah Administrative Code under Environmental Quality (Sections R307 to R317).

1.6.2 Required Permits and Approvals

Many of the Federal, Tribal, and State statutes and regulations identified in Section 1.6.1 require permits or approvals to demonstrate compliance. PFS has identified a number of permits and approvals that need to be developed and approved for the proposed action.[3] The sections below list the permits and approvals that have been identified by PFS and the status of PFS's applications to obtain them.

1.6.2.1 Federal Permits and Approvals

U.S. Nuclear Regulatory Commission: A license is required from the NRC. For a more detailed discussion see Section 1.5.1.

U.S. Department of Interior, Bureau of Indian Affairs: BIA approval of the lease between PFS and the Skull Valley Band is needed. For a more detailed discussion see Section 1.5.2.

U.S. Department of Interior, Bureau of Land Management: A right-of-way approval for either a new rail line or an ITF is needed. For a more detailed discussion see Section 1.5.3.

U.S. Surface Transportation Board: The STB would have to approve construction and operation of the new rail line and associated sidings. For a more detailed discussion, see Section 1.5.4.

U.S. Environmental Protection Agency: (1) National Pollutant Discharge Elimination System (NPDES)—With respect to all construction activity on the Reservation, a NPDES General Permit is available from EPA Region VIII to cover construction projects disturbing 0.4 ha (1 acre) or more on all tribal trust lands in Utah. However, PFS has provided information to EPA Region VIII indicating that no jurisdictional wetlands or other types of waters of the United States are located at the proposed site for the PFSF or along the proposed railroad alignment, nor do ephemeral drainages in these areas reach any jurisdictional waters. Based on this information, PFS has stated that it does not intend to apply for a NPDES permit.
(2) SDWA—All necessary registrations needed to ensure compliance with the Act and its enabling regulations regarding the use of on-site drinking water wells would be secured from EPA Region VIII. (3) Registration of Septic Tank/Leach Fields—Because the two proposed PFSF septic tank/leach field systems would qualify as Class V injection wells, an Underground Injection Control inventory form would be filed with EPA before the systems are placed into service.
(4) RCRA—EPA has RCRA authority over activities on the Reservation. The proposed PFSF is not expected to generate large quantities of hazardous wastes (as regulated under RCRA); therefore, the PFSF would likely be classified as a Conditionally Exempt Small Quantity Generator (CESQG). PFS will pursue obtaining a RCRA identification number from EPA Region VIII for use in documenting the management, tracking, and disposal of any small quantities of

[3]PFS has recorded in its Environmental Report (see PFS/ER 2001) its disagreement with the State of Utah concerning the permits, licenses, approvals, and other entitlements that must be obtained in connection with the PFS ISFSI license application.

hazardous waste. (5) Spill Control—PFS provided information that there is no reasonable expectation, even in the absence of any oil containment or control equipment, that a discharge of oil from the proposed PFSF would reach a jurisdictional water of the United States. Therefore, the proposed PFSF is not expected to require a Spill Prevention, Control, and Countermeasures (SPCC) plan.

U.S. Department of Interior, Fish and Wildlife Service: No specific permit or approval is needed from the FWS. However, a required consultation process has been conducted and completed between the Cooperating Federal Agencies and the FWS (see Section 1.5.5).

U.S. Department of Defense, Army Corps of Engineers (ACE): An extensive survey of the proposed rail corridor was undertaken in October 2000 to determine if any jurisdictional waters of the United States—particularly wetlands or perennial, intermittent, or ephemeral streams—are present along the proposed railroad alignment. This assessment was made to determine PFS's permitting obligations under CWA Section 404 (the dredge and fill permit program). The survey, which reflects the characteristics of the entire region, concluded that there are no jurisdictional wetlands or other waters along the proposed alignment. Furthermore, the ephemeral drainages in the region possess no characteristic ecosystems and end without reaching any jurisdictional water of the United States. The ACE has concurred with the survey's findings in a letter dated February 1, 2001, from the Chief, Utah Regulatory Office, U.S. Army Corps of Engineers. Therefore, no CWA Section 404 permit would be required.

1.6.2.2 Skull Valley Band of Goshute Indians Tribal Permits and Approvals

No specific permits are required at this time.

1.6.2.3 State of Utah Permits and Approvals for Activities Off the Reservation

Utah Department of Environmental Quality: The State of Utah regulates proper disposition of storm water through a Utah Pollution Discharge Elimination System (UPDES) General Permit (UAC R137-8-3.8). The UPDES is required for construction activities that disturb more than 0.4 ha (1 acre) in order to secure coverage under the UPDES permit authorizing construction-related storm water discharges. Since the construction activities for the rail line or the ITF would exceed this acreage limit, PFS would submit a notice of intent (NOI) at least 48 hours prior to initiation of construction activities. Before submitting the NOI, PFS would prepare a Storm Water Pollution Prevention Plan and would meet all other pre-permit application requirements as outlined in the UPDES General Permit.

Utah Department of Environmental Quality: A construction and operation license could be required for the ITF under UCA 19-3-301, 19-3-304, and 19-3-318 SF, which cover high-level nuclear waste transfer, storage, decay in storage, treatment, or disposal facilities. Utah defines a transfer facility as including any facility which transfers waste from and between transportation modes (as would occur at the ITF for this project). The Utah license would require the approval of the state Legislature and the Governor.

Utah Department of Transportation: In the event that heavy-haul vehicles are used to transport licensed SNF shipping casks on Skull Valley Road, a road-use permit would have to be obtained from the State because of the size and weight of the proposed vehicles.

Utah Department of Transportation: No tract of any railroad may be constructed across a public road, highway, or street at grade without the permission of the Utah Department of Transportation. PFS would be required to obtain that permission for such railroad construction, if any, meeting the stated conditions.

Utah State Historic Preservation Office (SHPO): While a specific permit is not required directly from the SHPO, PFS must comply with the terms of the Agreement completed between the parties of the consultation process required by Section 106 of NHPA (see Section 1.5.5).

Utah State Engineer: For the proposed rail corridor, PFS would be required to file an application to obtain a Stream Alteration Permit from the Utah State Engineer to satisfy CWA Section 401 water quality certification requirements, The State Engineer would certify that the proposed construction activities would not cause an exceedance of State water quality standards or otherwise be in violation of a State requirement.

Utah State Division of Water Rights: Water rights in Tooele County are regulated by the State, which allocates use through water rights processes. Any use of surface water or groundwater in Skull Valley other than on the Reservation by PFS would be subject to these processes.

Utah State legislation concerning high-level nuclear waste: The State of Utah enacted legislation in Utah S.B. 81 (2001) establishing extensive (and possibly prohibitive) requirements relating to the transportation, transfer, or storage of high-level nuclear waste within the exterior borders of the State. The legislation amends UCA 17-27-102, 17-27-301, 17-27-303, 17-34-1, 17-34-3, 19-3-301, 19-3-302, 19-3-303, 19-3-308, 19-3-309, 19-3-312, 34-38-3, and 73-4-1; and enacts UCA 17-27-308, 17-34-6, and 19-3-319. These provisions would affect PFS and private parties and governmental entities that may wish to enter into agreements with PFS in connection with the transportation, transfer, or storage of nuclear waste within the exterior borders of the State of Utah. This legislation is also currently being challenged by the Band and PFS [Skull Valley Band of Goshute Indians and Private Fuel Storage v. Leavitt, Civil No. 2:01CV00270C (D. Utah, filed April 19, 2001)].

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2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section presents the details of the proposed action (i.e., construction and operation of the proposed PFSF and the new rail line), as well as reasonable alternatives to the proposed action that have been considered and evaluated in this FEIS. The information presented in this section provides the basic project information upon which the potential impacts have been assessed in Chapters 4, 5, and 6 of this FEIS.

Section 2.1 describes the details of constructing and operating the proposed facility at the Reservation. Most of this information was provided in PFS's Environmental Report (PFS/ER 2001) and Safety Analysis Report (PFS/SAR 2001). Section 2.1 also provides the details of transporting SNF through Skull Valley.

Section 2.2 discusses (a) alternative storage technologies, (b) PFS's site selection process, (c) an alternative location for the proposed PFSF on the Reservation, (d) alternative modes of transporting SNF, and (e) the no-action alternative. Section 2.2 also discusses an alternate site located in Wyoming. The no-action alternative (i.e., not constructing the proposed PFSF or its associated transportation facilities) is included to provide a basis for comparing and evaluating the potential impacts of constructing and operating the proposed facility.

A comparison of the potential environmental impacts of the alternatives is presented in Chapter 9.

2.1 Proposed Action

The proposed action considered in this FEIS is the construction and operation of the proposed PFSF on the Reservation and the construction and operation of a new rail line. Implementation of the proposed action would require the following Federal actions: BLM approval of an amendment to the Pony Express RMP and granting a right-of-way approval for the use of public lands managed by BLM for a new rail line through Skull Valley; STB approval of the construction and operation of this new rail line; the issuance of an NRC license for the proposed PFSF; and BIA approval of a lease for the use of tribal trust lands allowing for the construction and operation of the proposed PFSF. An overview of the proposed project is given in Section 1.2. This section provides a more detailed description of the construction and operation of the proposed PFSF and transportation options. Upon approval by each of the Cooperating Federal Agencies, and satisfaction of any other necessary requirements PFS would proceed with constructing and operating the proposed PFSF, under conditions prescribed by the BIA, BLM, STB, and NRC, as appropriate.

2.1.1 Proposed Site and Description of Associated Facilities

2.1.1.1 Site Description

The proposed site is approximately 93 km (58 miles) straight-line distance southwest of Utah's State Capitol Building [or about 120 km (75 miles) by road] and approximately 44 km (27 miles) west-southwest of Tooele (see Figure 1.1). The proposed site is located on the Reservation within the geographic boundaries of Tooele County, Utah, about 6 km (3.5 miles) west-northwest of the Skull Valley Band's village (see Figure 2.1). Approximately 30 people live on the Reservation, and the

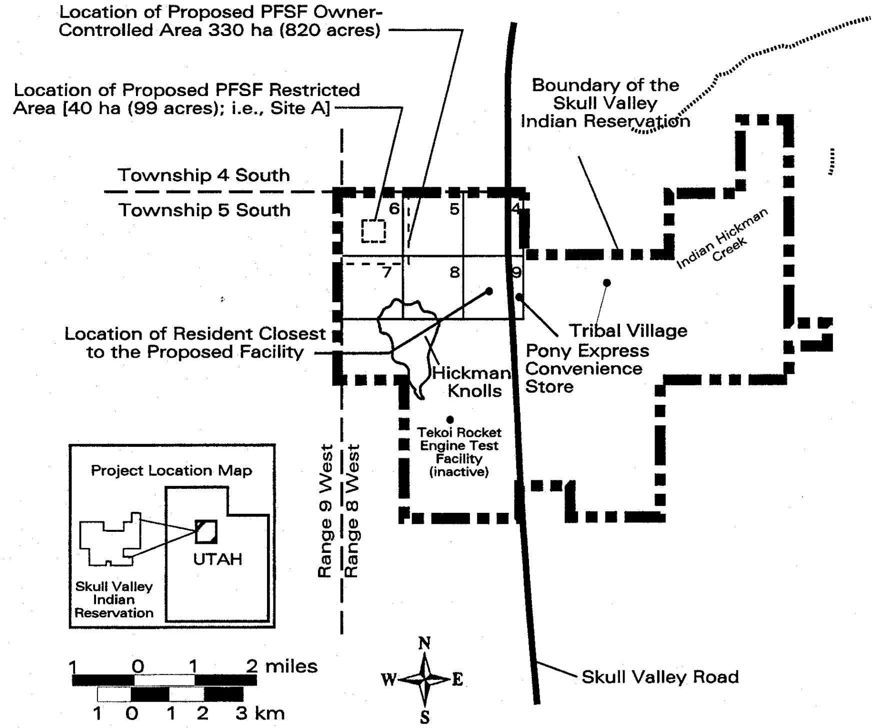

Figure 2.1. Location of the proposed site (i.e., Site A) for the PFSF on the Reservation.

resident's home nearest to the site is about 3 km (2 miles) to the east-southeast. PFS plans to lease 330 ha (820 acres) from the Skull Valley Band in the northwest corner of the Reservation. As shown in Figure 2.1, the property to be leased occupies all of Section 6 and portions of Sections 5, 7, and 8 in Township 5 South (T5S), Range 8 West (R8W). The northwest corner of the proposed 40-ha (99-acre) facility is at 40° 24' 50" north latitude and 112° 47' 37" west longitude. The area immediately around these sections is undeveloped rangeland owned by the Skull Valley Band, public lands managed by the BLM, and privately owned land.

The site is on a relatively flat valley floor, with elevations ranging from about 1,355 m (4,450 ft) above sea level at the northwest corner of the site to 1,370 m (4,490 ft) at the southeast corner. The Stansbury Mountains [with elevations up to 3,300 m (11,000 ft)] lie approximately 8 km (5 miles) to the east of the site, while the Cedar Mountains [with elevations up to 2,300 m (7,700 ft)] lie about 13 km (8 miles) to the west.

Additional detail on the existing environment at the proposed site is contained in Section 3 in this FEIS.

2.1.1.2 Facility Description

The basic site plan for the proposed PFSF is shown in Figure 2.2. A fence would mark the boundaries of the 330-ha (820-acre) leased area, designated for the purposes of this FEIS as the Owner Controlled Area (OCA)[1], and a 40-ha (99-acre) restricted-access area within the OCA (see Figure 2.1) would contain the storage pads and some of the support facilities. The restricted-access area would be located at the approximate center of the OCA. The entire OCA would be enclosed by a typical four-strand barbed wire range fence, which would meet the requirements of the BIA. Fencing around the restricted-access area would consist of two 2.4-m (8-ft) chain link security fences topped with barbed wire. The inner fence would be separated from the outer chain link nuisance fence by a 6-m (20-ft) isolation area. A new 4-km (2.5-mile) access road would lie within an 82-ha (202-acre) right-of-way on the Reservation (see Figures 2.1 and 2.2). The road would be built east of the site and would connect the site to the existing Skull Valley Road. No fence would be constructed to enclose the new access road. Buildings and storage areas would primarily be located within the restricted-access area, with the exception of the Administration Building, Concrete Batch Plant, and Operations and Maintenance Building, which would be located on the site outside the security fences. Portions of the OCA would be landscaped (revegetated), and PFS would develop landscaping plans with the BIA and the Skull Valley Band.

Construction plans. Construction of the proposed PFSF would occur in three phases. Phase 1 (approximately 18 months) would include construction of the major buildings, one-fourth of the total number of proposed storage pads (i.e., those in the southeastern quadrant of the restricted-access area), the access road, a new rail siding and new rail line. The objective of Phase 1 is to provide an operational facility with a portion of the storage pads completed in time to meet the immediate needs of the power reactor companies that would be shipping SNF. The anticipated workforce requirements are shown in Table 2.1. Phase 1 would require a peak work force of up to 255 workers, including

[1] For the purpose of this FEIS, OCA is defined as the property to be leased by PFS from the Skull Valley Band.

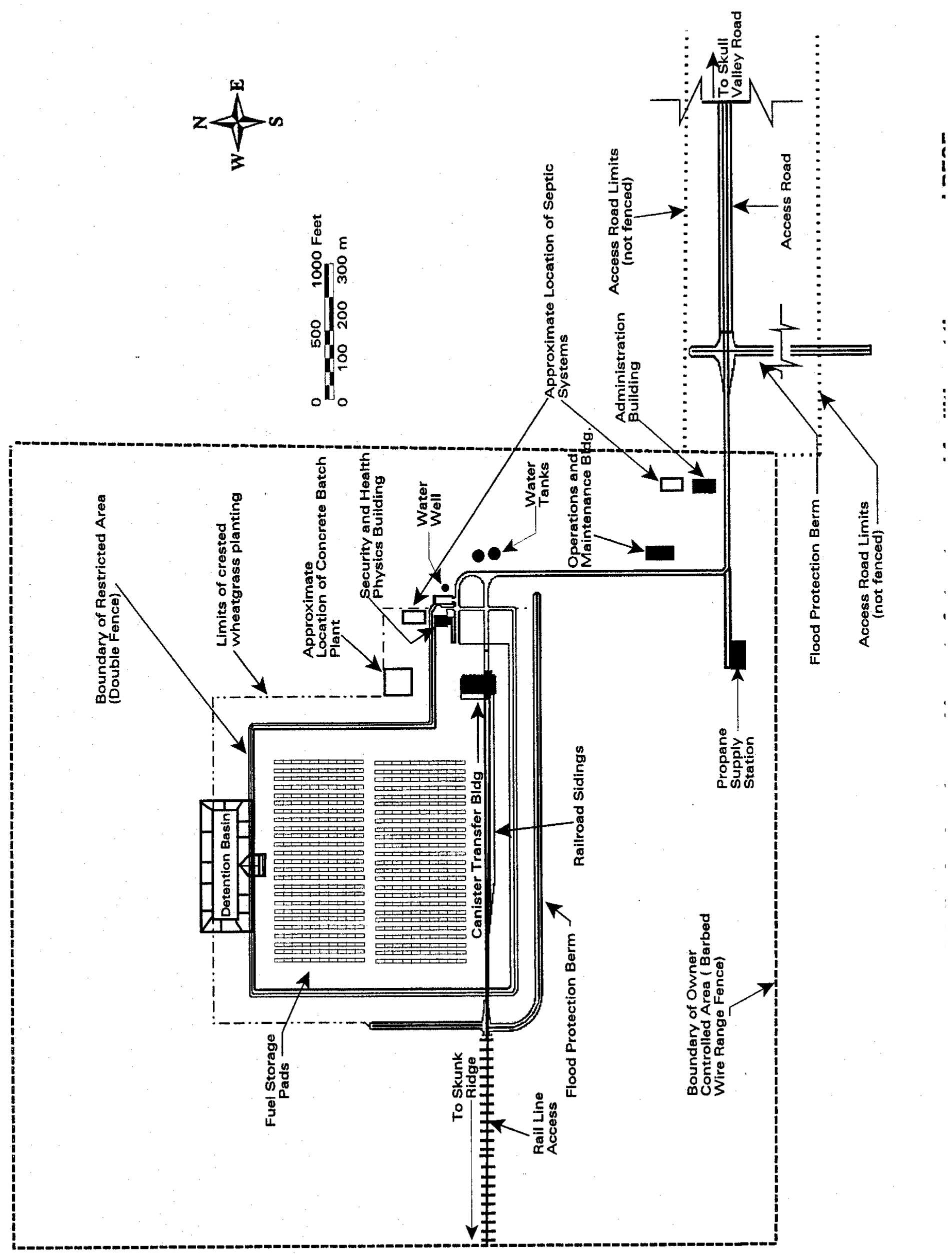

Figure 2.2. Basic site plan and layout of structures and facilities at the proposed PFSF.

Table 2.1. Anticipated peak workforce requirements at the proposed PFSF and new rail corridor

	Construction workers (Phase 1)	Workers during operations (includes Phase 2 and 3 construction)
PFSF	130	43
Rail line	125	2
Total	255	45

130 workers at the Reservation site and as many as 125 additional workers for the new facilities that would connect with the existing Union Pacific rail line (see Section 2.1.1.3). Phase 1 would be completed in about 18 months. Approximately 66 ha (164 acres) of Reservation land would be affected during construction.

Phase 2 would include construction of storage pads in the southwestern quadrant of the restricted-access area, and Phase 3 would include construction of the remaining storage pads (the two northern quadrants). The timing for initiating Phases 2 and 3 would depend on the anticipated needs of the power reactor companies for additional SNF storage capacity. PFS currently estimates the duration of both Phase 2 and Phase 3 construction to be 5 years. The construction work force for Phases 2 and 3 activities is estimated to be about 43 workers.

Storage casks would be constructed on an as-needed basis during Phases 2 and 3 of the facility's construction. As shown in Figure 2.2, a concrete batch plant would be located to the east of the restricted-access area throughout the lifetime of the proposed PFSF to provide concrete for construction of the facilities and the storage casks. The footprint of this batch plant would encompass approximately 0.8 ha (2 acres) and would be sized for a maximum capacity of 57 m^3 (75 yd^3) per hour.

Tables 2.2a, 2.2b, and 2.2c describe the types and quantities of construction materials to be used during the construction of the proposed PFSF project. PFS plans to obtain materials from private, commercial sources in and around Skull Valley and the Tooele area (PFS/ER 2001). While it would be premature to attempt an identification of the likely sources of construction materials for the proposed action, PFS has conducted a study/survey of possible sources of aggregate that could be used for construction of railroad beds, roads, base for building foundations, and aggregate for concrete (see Section 3.1.4).

Storage pads and casks. When fully completed, the proposed PFSF would contain modular concrete storage pads that would be 20 × 9 × 1 m (67 × 30 × 3 ft) as shown in Figure 2.3. Each storage pad would be constructed flush with grade level and would hold up to eight storage casks in a 2 × 4 array. [Modular concrete storage pad design provides for ease of construction by limiting the number of concrete pad construction joints and/or expansion joints required and allows for staged construction of the proposed PFSF (PFS/SAR 2001)]. Five hundred such pads would be arranged as shown in Figure 2.2, resulting in a total capacity for the facility of 4,000 storage casks. Areas between the storage pads would be surfaced with a 20-cm (8-inch) thickness of compacted crushed rock and sloped toward the north to facilitate drainage.

Table 2.2a. Materials to be imported and used in the construction of the proposed PFSF and the Skunk Ridge rail line

Material type	PFSF construction (includes storage pads, but not storage casks)			Construction of rail access corridor from Skunk Ridge	Total material required
	Phase 1 (approx. 18 months)	Phase 2 (approx. 5 years)	Phase 3 (approx. 5 years)		
Cement	22,000 m^3 (28,800 yd^3)	14,400 m^3 (18,900 yd^3)	21,700 m^3 (28,400 yd^3)	N/A	58,100 m^3 (76,100 yd^3)
Concrete aggregate:					
Small (sand)	16,000 m^3 (21,000 yd^3)	7,800 m^3 (10,200 yd^3)	16,200 m^3 (21,200 yd^3)	N/A	40,000 m^3 (52,400 yd^3)
Large (crushed rock)	12,400 m^3 (16,300 yd^3)	6,200 m^3 (8,100 yd^3)	12,800 m^3 (16,800 yd^3)	N/A	31,400 m^3 (41,200 yd^3)
Total concrete aggregate	28,400 m^3 (37,300 yd^3)	14,000 m^3 (18,300 yd^3)	29,000 m^3 (38,000 yd^3)	N/A	71,400 m^3 (93,600 yd^3)
Crushed rock:					
Access road base	24,800 m^3 (32,500 yd^3)	N/A	N/A	N/A	24,800 m^3 (32,500 yd^3)
Storage area grading (plus buildings area grading for Phase 1)	32,000 m^3 (42,000 yd^3)	11,800 m^3 (15,500 yd^3)	25,600 m^3 (33,500 yd^3)	N/A	69,400 m^3 (91,000 yd^3)
Rip-Rap	8,500 m^3 (11,100 yd^3)	N/A	N/A	N/A	8,500 m^3 (11,100 yd^3)
Total crushed rock	65,300 m^3 (85,600 yd^3)	11,800 m^3 (15,500 yd^3)	25,600 m^3 (33,500 yd^3)	N/A	102,700 m^3 (134,600 yd^3)
Sub-ballast	N/A	N/A	N/A	172,000 m^3 (225,000 yd^3)	172,000 m^3 (225,000 yd^3)
Ballast	N/A	N/A	N/A	73,000 m^3 (95,700 yd^3)	73,000 m^3 (95,700 yd^3)
Asphalt paving	7,300 m^3 (9,600 yd^3)	N/A	N/A	N/A	7,300 m^3 (9,600 yd^3)

Table 2.2b. Materials to be imported and used in the construction of SNF storage casks at the proposed PFSF

Material type	SNF storage casks manufactured during PFSF construction: Phase 1 (approx. 18 months; no casks constructed)	SNF storage casks manufactured during PFSF construction: Phase 2 (1000 casks over approx. 5 years)	SNF storage casks manufactured during PFSF construction: Phase 3 (1000 casks over approx. 5 years)	SNF storage casks manufactured during remainder of 20-year life of PFSF (2000 casks over approx. 10 years)	Total material required
Cement	N/A	6,000 m^3 (7,850 yd^3)	6,000 m^3 (7,850 yd^3)	12,000 m^3 (15,700 yd^3)	24,000 m^3 (31,400 yd^3)
Concrete aggregate:					
Small (sand)	N/A	12,000 m^3 (15,650 yd^3)	12,000 m^3 (15,650 yd^3)	23,900 m^3 (31,300 yd^3)	47,900 m^3 (62,600 yd^3)
Large (crushed rock)	N/A	18,000 m^3 (23,500 yd^3)	18,000 m^3 (23,500 yd^3)	35,900 m^3 (47,000 yd^3)	71,900 m^3 (94,000 yd^3)
Total concrete aggregate	N/A	30,000 m^3 (39,150 yd^3)	30,000 m^3 (39,150 yd^3)	59,800 m^3 (78,300 yd^3)	119,800 m^3 (156,600 yd^3)

N/A = This type of material is not required for the indicated phase of construction.

Source: PFS/ER 2001; Sections 4.1.7.1 through 4.1.7.3. Material requirements are based on assumed finished concrete volume that is equivalent to one part cement, two parts sand, and three parts crushed rock. No credit was taken for volumetric expansion.

Table 2.2c. Total amounts of cement and concrete aggregate to be imported and used in the construction of the proposed PFSF and the SNF storage casks

Material type	**PFSF construction plus storage cask construction** Phase 1 (approx. 18 months)	Phase 2 (approx. 5 years)	Phase 3 (approx. 5 years)	**SNF storage casks manufactured during remainder of 20-year life of PFSF**	**Total material required**
Cement	22,000 m^3 (28,800 yd^3)	20,400 m^3 (26,750 yd^3)	27,700 m^3 (36,250 yd^3)	12,000 m^3 (15,700 yd^3)	82,100 m^3 (107,500 yd^3)
Concrete aggregate:					
Small (sand)	16,000 m^3 (21,000 yd^3)	19,800 m^3 (25,850 yd^3)	28,200 m^3 (36,850 yd^3)	23,900 m^3 (31,300 yd^3)	87,900 m^3 (115,000 yd^3)
Large (crushed rock)	12,400 m^3 (16,300 yd^3)	24,200 m^3 (31,600 yd^3)	30,800 m^3 (40,300 yd^3)	35,900 m^3 (47,000 yd^3)	103,300 m^3 (135,200 yd^3)
Total concrete aggregate	28,400 m^3 (37,300 yd^3)	44,000 m^3 (57,450 yd^3)	59,000 m^3 (77,150 yd^3)	59,800 m^3 (78,300 yd^3)	191,200 m^3 (250,200 yd^3)

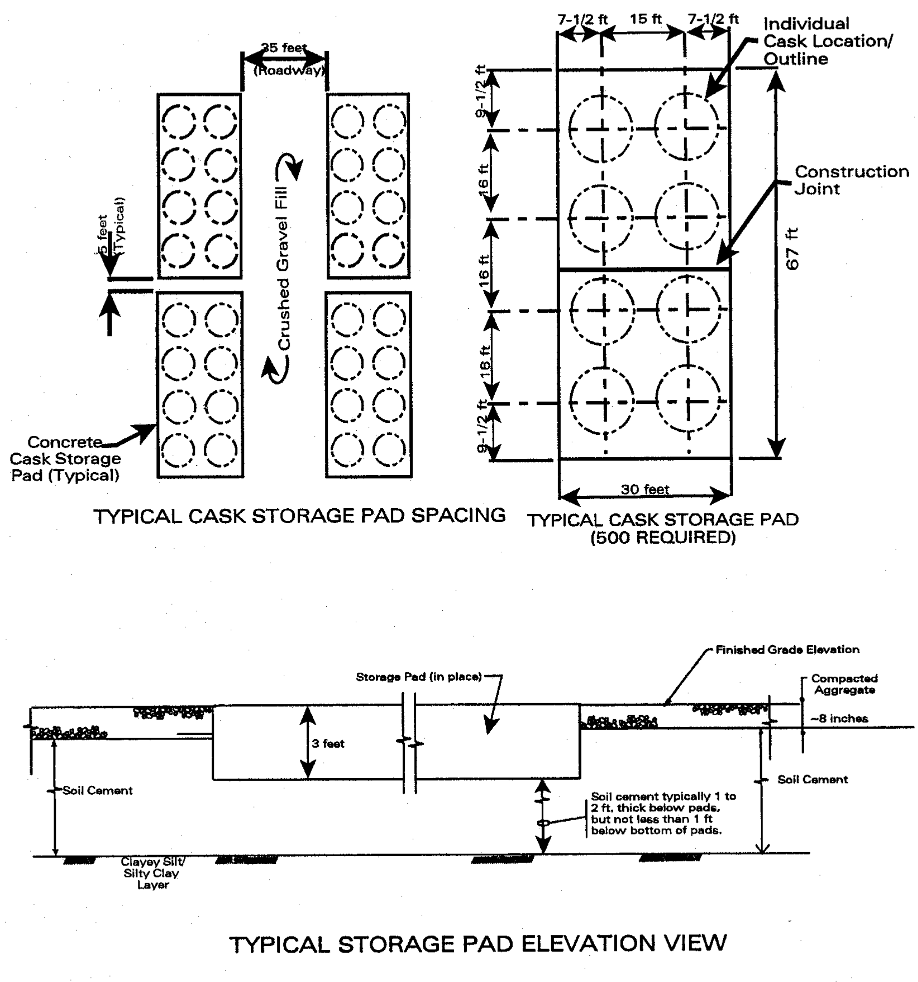

Figure 2.3. Storage pad detail. Note: 1 ft = 0.3048 m

As described in greater detail in Section 2.1.2.2, the storage casks would be cylindrically shaped concrete and steel structures, approximately 3.4 m (11.0 ft) in diameter and 6.1 m (20.0 ft) high. The steel liners of the casks would be manufactured off-site and transported to the proposed PFSF. The storage casks would be assembled on-site using concrete from the on-site batch plant and the steel liners supplied by the cask vendor. The casks would be assembled at the batch plant on an as-needed basis.

Principal buildings. In addition to the storage pads described above, there would be four buildings that would be constructed as part of the proposed PFSF (see Figure 2.2): the Canister Transfer Building, the Security and Health Physics Building, the Operations and Maintenance Building, and an Administration Building. Each of these structures would be designed according to its intended function. The function of each building is described in the paragraphs below.

The Canister Transfer Building (see Figure 2.2) would be a massive, reinforced-concrete, high-bay structure approximately 60-m (200-ft) wide, 80-m (260-ft) long, and 27-m (90-ft) high. This building would facilitate the transfer of the SNF canister from its shipping cask into the storage cask. To support the operations described in detail in Section 2.1.2.2, the Canister Transfer Building would be equipped with a 180-metric-ton (200-ton) overhead bridge crane for moving the shipping casks, a 135-metric-ton (150-ton) semi-gantry crane for canister transfer operations, and three canister transfer cells to provide a radiation-shielded work space for transferring the SNF canisters from the shipping casks to the storage casks. Shipping casks would be moved into the high bay portion of the building either on railcars or heavy/haul trailers, depending on which transportation option is chosen.

The Security and Health Physics Building would be the entrance point for the 40-ha (99-acre) restricted-access area. The building would be located adjacent to the Canister Transfer Building and would consist of a single-story, concrete masonry structure approximately 23 m (76 ft) wide, 37 m (120 ft) long, and 5.5 m (18 ft) high. This building would provide office and laboratory space for security and health physics staff and would house security, communication, and electrical equipment needed for these personnel.

Both the Administration Building and the Operations and Maintenance Building would be located outside the restricted-access area. The Administration Building would consist of a single story, steel frame building approximately 24 m (80 ft) wide, 46 m (150 ft) long, and 5 m (17 ft) high, and would include office and records management space, an emergency response center, meeting rooms, and a cafeteria. The Operations and Maintenance Building would consist of a single story, steel frame building approximately 24 m (80 ft) wide, 61 m (200 ft) long, and 8 m (26 ft) high. This building would house maintenance shops and storage areas for spare parts and equipment to service vehicles and equipment at the facility.

Paved parking areas would be constructed adjacent to the Administration Building, the Operations and Maintenance Building, and the Security and Health Physics Building. The paved area at the Administration Building would cover 0.3 ha (0.8 acres). The paved area at the Operations and Maintenance Building would occupy 1 ha (2.5 acres), including a 0.2-ha (0.5-acre) asphalt lay down area. The paved area at the Security and Health Physics Building would cover 0.08 ha (0.2 acre).

Foundations and footings. Field investigations indicate that the soils underlying a silty layer at the surface of the proposed PFSF site are suitable for supporting the proposed structures; therefore, no special construction techniques would be required for improving the subsurface conditions below this silt layer. The silt layer, in its *in situ* loose state, is not a suitable foundation for the proposed storage pads, and improvements would be required to enhance the strength of this silt layer. The silt layer would be removed from the storage pad area and from around the foundation area for the Canister Transfer Building and would be replaced with a soil-cement mixture. The silt excavated from the storage pad emplacement area would be mixed with sufficient portland cement and water and compacted to form a strong soil-cement subgrade to support the cask storage pads. The footings and foundation for the Canister Transfer Building would be founded on the clayey layer beneath the silt layer and would be surrounded by a soil-cement mat. The required characteristics of the soil-cement would be engineered during detailed design to meet the necessary strength requirements.

Using soil-cement to stabilize the silt layer would reduce the amount of spoil materials generated, would create a stable and level base for storage pad construction, and would substantially improve the sliding resistance of the storage pads. The soil-cement would also be used to replace the compacted structural fill that was included in the original plan between the rows of pads, thus reducing the number of truck trips that would be required to import fill material.

Access road, flood protection structures, and erosion control structures. An 82-ha (202-acre) right-of-way between the leased 330-ha (820-acre) site and Skull Valley Road would contain an access road to the proposed facility and overhead power and telephone lines. Construction of the road would require clearing an area of about 9 ha (22 acres). During initial construction, the access road would be built with a gravel surface and paved with asphalt at the end of major Phase 1 site earthwork. The road would consist of two 4.5-m (15-ft) lanes. Parking areas around the Administration Building, Security and Health Physics Building, and the Operation and Maintenance Building would be surfaced with asphalt or concrete. PFS plans to obtain asphalt for paving the access road and parking lots from existing asphalt plants in the area (PFS/ER 2001).

An earthen diversion berm would be built (from materials removed from the storage pad area) around the uphill sides of the storage area (i.e., along the south and west sides, as shown in Figure 2.2) to protect the site from PMF events by diverting storm runoff away from the storage pads and into the natural drainage basin located to the north. (The rail line access would be constructed to pass over the berm.) This L-shaped berm would be about 15 m (50 ft) wide, 1,310 m (4,300 ft) long, and 1.5 m (5 ft) high. The top of this berm would be at an elevation of 1,365 m (4,480 ft) above sea level. The earthen berm would be covered with riprap (i.e., loosely assembled, large pieces of broken or crushed stone) to resist wind erosion, as well as water erosion from runoff during storms.

A second, separate earthen berm would be built (from materials removed from the storage pad area) perpendicular to the access road about 230 m (750 ft) east of the site boundary (see Figure 2.2), but within the access road right-of-way, to divert flood runoff originating from the Stansbury Mountains. The access road would pass over the berm. This berm would span a local topographical low between existing ridges and would be about 19.5 m (64 ft) wide, 580 m (1,900 ft) long, and a maximum of 2.7 m (9 ft) high. The top of this berm would be at an elevation of 1,374 m (4,507.5 ft) above sea level, and it too would be covered with riprap. Specific details regarding the design and construction of the berms are given in the SAR and the NRC's SER, as updated. These reports address safety issues associated with potential flooding at the proposed facility.

On-site drainage at the storage pad area would be conveyed by a surface flow system to a 3-ha (8-acre) stormwater collection and detention basin to be located at the northern boundary of the restricted-access area (see Figure 2.2). Water collected in this detention basin would be allowed to either evaporate or percolate into the ground. The detention basin would be 245 m (800 ft) wide and 60 m (200 ft) long, and 3 m (10 ft) deep. The basin would be designed for a 100-year storm event.

Water drainage from the storage site as a result of a typical rainstorm is expected to soak into the ground before it reaches the detention basin. In the event of excessive rainfall or snowmelt that results in standing water in the detention basin, PFS has committed to pumping out the collected water. The basin would be constructed with compacted soil and would have side slopes of 10 to 1. The gradual side slopes would reduce the velocity of the rain water flowing into the basin, thereby reducing the potential for wind or water erosion. The sides and bottom of the detention basin would be planted with crested wheatgrass to provide additional stabilization.

Utilities and other services. Lighting would be designed for the security, monitoring, and surveillance of the storage casks. Lighting for the 40-ha (99-acre) restricted-access area would be provided by lights atop 40-m (130-ft) poles located at the perimeter of the area. The light fixtures would be downcast and shielded to minimize light pollution.

Electrical power for lighting, the security system, equipment operation, and other general purposes would be obtained from a new transformer that would be connected with new lines on standard poles to the existing 12.5-kV distribution line that runs along Skull Valley Road. Backup power for the security system, emergency lighting, and the site public address system would be provided by a diesel generator located in the Security and Health Physics Building. The communication system would consist of telephones, a public address system, and short-wave radio equipment.

All the buildings at the proposed PFSF would be heated with propane. Additional electric baseboard heaters could be used in the offices located in the Canister Transfer Building. A group of four propane tanks would be located at a minimum distance of 550 m (1,800 ft) from the Canister Transfer Building and the cask storage area. Each propane tank would hold up to 19 m^3 (5,000 gal).

A potable water supply system would be provided for the facility, taking water from either a groundwater well on the site or off-site sources. Because it is unlikely that a well drilled into the mid-valley aquifer would yield adequate quantities of water on demand, above-ground storage tanks would be erected for potable water, water for use in extinguishing fire, and water for the concrete batch plant. The water tanks would likely be located outside the restricted-access area between the concrete batch plant and the restricted-access area fence. A fire suppression system in the Canister Transfer Building would be fed by fire pumps and by a primary and a backup water tank [each with a capacity of 380 m^3 (100,000 gal)] to be located outside the restricted-access area.

Water requirements at the proposed PFSF would be similar to a light industrial facility having a 24-hr per day workforce, with the greatest water use being during construction for dust suppression and operation of the concrete batch plant. Projected water usage is shown in Table 2.3. Maximum daily water use for construction of the proposed PFSF would occur at the beginning of Phases 1, 2, and 3 of the construction schedule and would require as much as 524 m^3/day (138,300 gal/day) of which 511 m^3/day (135,000 gal/day) would be supplied from private off-site sources and 12 m^3/day (3,300 gal/day) would be supplied from an on-site well. The peak daily water consumption from the on-site well during construction would occur during Phase 1 and would be 38 m^3/day (10,000 gal/day). Over the entire construction and operational lifetime of the proposed PFSF, the average water withdrawal rate from the well would be about 11 m^3/day (2,964 gal/day), 2.1 gpm, or 3.3 acre-ft/year.

Table 2.3. Summary of water requirements during construction of the proposed PFSF

Phase of construction	Construction period	Estimated total water use[a] [m^3/day (gal/day)]	Estimated water use from on-site wells [m^3/day (gal/day)]
Phase 1 (18-months)	Period 1; first 6 weeks	524 (138,300)	12 (3,300)
	Period 1; following 2 weeks	223 (58,800)	12 (3,300)
	Period 2; first 5 months	248 (65,500)	38 (10,000)
	Period 2; following 2 months	182 (48,200)	38 (10,000)
	Period 3; first 2 months	168 (44,500)	21 (5,600)
	Period 3; following 7 months	103 (27,200)	21 (5,600)
Phase 2 (5 years)	Period 1; first 6 weeks	449 (118,600)	17 (4,400)
	Period 2; following 5-year period	27 (7,100)	17 (4,400)
Phase 3 (5 years)	Period 1; first 12 weeks	358 (94,600)	20 (5,400)
	Period 2; following 5-year period	34 (8,900)	20 (5,400)

[a]Usage includes water for soil compaction, soil cement, dust control, concrete, and worker consumption.

Construction of the new rail line from Skunk Ridge would require a daily water use of 624 m^3/day (165,000 gal/day), which would primarily be used for soil compaction and wetting of haul roads to minimize dust emissions. Additional water would be required for making concrete for culverts on the rail line. The quantity of water required for making this concrete is minimal in terms of the project requirements. Water could also be required during the proposed revegetation of the site and the rail corridor; however, estimated quantities will be available only upon finalization of the revegetation plan prior to construction. The amounts of water that could be needed during revegetation would be small with respect to the total water requirements of the proposed project. Water for worker use and for concrete could be obtained from new on-site wells; the remaining water, suitable for construction uses, would be obtained from off-site sources. In the event that on-site water quality or quantity is inadequate, potable water would be obtained directly from the Reservation’s existing water supply, or additional water well(s) would be drilled east of the site, outside the OCA, but still within the Reservation boundaries. If such additional wells are needed on the Reservation, they would need to be approved by BIA and could be subject to a separate environmental review under NEPA. Alternative or additional sources of water are available from private sources within 24 km (15 miles) of the proposed rail siding at Skunk Ridge (PFS/ER 2001).

A sanitary drainage system, using underground pipes, would be installed to serve the proposed buildings and to transmit liquid wastes to underground septic systems. Drain sumps (see Section 2.1.3) would be provided in the Canister Transfer Building. Two separate septic tank and drain-field systems would be constructed to collect and process the waste water from the sanitary drainage system. One system would be constructed near the Security and Health Physics Building to serve the storage portion of the proposed PFSF, and another system would be constructed near the Administration Building to serve the balance of the proposed PFSF. The underground septic system would require clearing a total area of about 0.8 ha (2 acres). The two septic systems, each with a capacity to serve approximately 20 people, would be expected to process less than 19 m^3/day (5,000 gal/day). The size of the systems requires an Underground Injection Control registration with EPA.

A 4-m^3 (1,000-gal) aboveground diesel fuel oil storage tank would be located inside the restricted-access area adjacent to the Security and Health Physics Building and would supply fuel for the cask transporter to be used in moving the storage casks onto the storage pads. This tank would be supplied with fuel from a regional bulk fueling service. No on-site locomotive fuel storage would be provided. The locomotives would be refueled off-site by tanker trucks provided by a regional bulk fueling service.

2.1.1.3 New Rail Line

PFS has proposed to transport SNF from the existing Union Pacific rail line at the north end of Skull Valley to the proposed PFSF by rail. PFS's proposed option is to build a new rail line to the site from the existing, main rail line at Skunk Ridge (near Low, Utah), southward along the west side of Skull Valley and then eastward across the valley to the site (see Figure 1.2).

Currently, there is no existing rail service to the Reservation. The nearest rail line is the Union Pacific Railroad approximately 39 km (24 miles) to the north (see Figure 1.2). PFS proposes to construct a new rail siding to connect to the existing Union Pacific main line at Skunk Ridge, near Low, Utah, and a new rail line that would run to the proposed PFSF site through public lands administered by the BLM on the eastern side of the Cedar Mountains. The descriptions below are taken from PFS's right-of-way application and Plan of Development for the new rail line (Donnell 1999; Hennessy 1999).

Construction of the new rail line is expected to last about 14 months and would occur simultaneous with the construction of the PFSF on the Reservation. The proposed rail line would be designed, constructed, operated, and maintained in accordance with Federal Rail Administration requirements for Class 3 track. A peak workforce of 125 workers would be needed during the construction period, primarily for earthwork. The types of equipment to be used include bulldozers, scrapers, dump trucks, front-end loaders, compactors, graders, and water trucks. Other work activities would be associated with laying the sub-ballast and ballast (i.e., the foundation and bed) for the track, and laying the track.

The proposed right-of-way for the rail line would be approximately 51 km (32 miles) long and 60 m (200 ft) wide. An additional "temporary use area" of 15 m (50 ft) on each side of the 60-m (200-ft) permanent right-of-way would also be needed for topsoil stockpiles and other construction uses. These additional use areas would be needed only until the end of the 14-month construction period.

For the construction of the rail line, approximately 314 ha (776 acres) within the proposed 60-m (200-ft) right-of-way would be cleared. This does not include any clearing within the 15-m (50-ft) "temporary use area" on both sides of the right-of-way because PFS has proposed only limited and minor uses of this area. About 63 ha (155 acres) of the right-of-way would be disturbed for the life of the project. Approximately 251 ha (621 acres) of the right-of-way would be revegetated after construction of the rail line has been completed. Clearing of the right-of-way would involve the removal and disposal of vegetation along the 12-m (40-ft) wide rail bed, at cut and fill areas, and at soil stockpile locations within the temporary use areas. Woody vegetation would be shredded and scattered in place. Ravines and other features would be reestablished after construction.

A new rail siding would be constructed at Skunk Ridge within the proposed 60-m (200-ft) right-of-way and would consist of two single tracks spaced 4.5 m (15 ft) apart and parallel to the proposed new rail line (see Figure 2.4). The total length of the new siding would be about 760 m (2,500 ft). Other than the new track, no new structures would be constructed at the proposed Skunk Ridge rail siding.

Other than an unimproved road, there is no existing access from the Low interchange of Interstate 80 to the site of the proposed rail siding. The unimproved road consists of unmaintained portions of the former U.S. Highway 40. PFS proposes to use the area at the Low interchange to unload construction vehicles and to move them to the construction site by using the existing unimproved road. The existing Union Pacific main line passes beneath Interstate 80 at 6 to 9 m (20 to 30 ft) below grade level near the location of the proposed new siding. The new siding would require extensive excavation to connect the new rail line to the existing main line just south of the interstate. Approximately 200,000 m^3 (261,000 yd^3) of material would have to be removed. This material would be expected to serve as fill material for the northern portion of the proposed new rail line near the new siding.

The bed for the new rail line would be approximately 12 m (40 ft) wide. The rail bed would be composed of a standard 4-ft, 8.5-in gauge single track, a 5-m (17-ft) wide layer of ballast material, a 10-m (34-ft) wide layer of sub-ballast material, and a 1-m (3-ft) wide cleared area on each side of the sub-ballast (see Figure 2.5).

Any of the remaining right-of-way which is disturbed during construction would be revegetated using the native seed mix recommended by the BLM. The top of the completed rail line would be approximately 1.4 m (4.5 ft) above the surrounding terrain.

The ballast and sub-ballast for the new rail line would be composed of crushed gravel or rock and would be obtained from an existing commercial gravel pit in the area. Approximately 172,000 m^3 (225,000 yd^3) of sub-ballast and 73,000 m^3 (95,700 yd^3) of ballast would be needed.

The proposed rail alignment crosses relatively flat terrain. Except for the area near the proposed siding, which would require excavation as described above, relatively few cuts and fills would be necessary. An attempt would be made to balance the expected volume of cuts and fills to minimize the need for additional fill material. It is estimated that the total amount of cut material would be about 676,000 m^3 (884,000 yd^3) [including the 200,000 m^3 (261,000 yd^3) near the new rail siding, as discussed above]. The total amount of fill material expected to be needed would be about 480,000 m^3 (628,000 yd^3); thus, a surplus of material would be generated [about 196,000 m^3 (256,000 yd^3)]. PFS has indicated that all excess material would be used as embankment dressing, however, the amounts of estimated cut and fill material will be revised and refined in the future to ensure this is possible. In any event, BLM would require that any excess material not used for embankment dressing or other useful purposes be removed from the right-of-way.

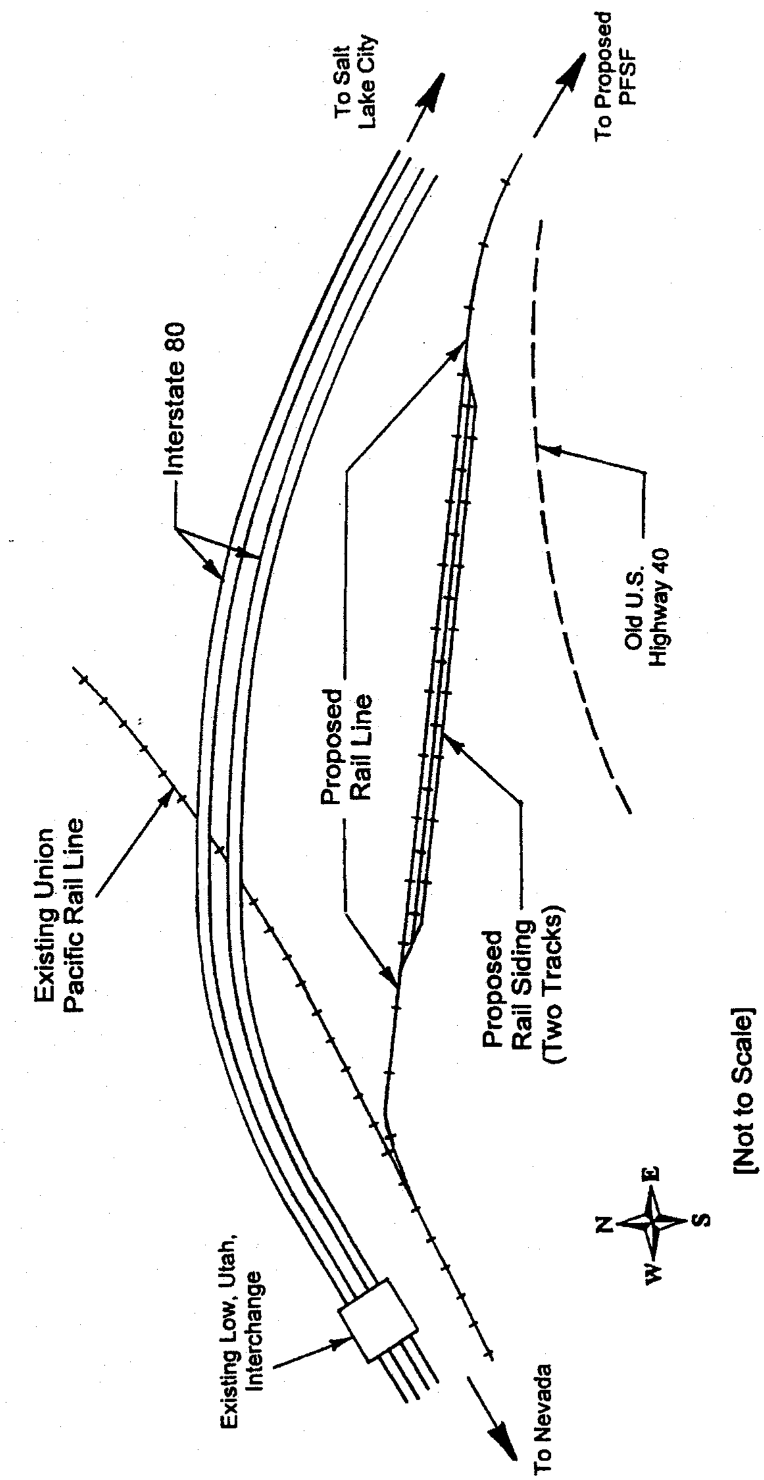

Figure 2.4. Basic site plan and layout for the proposed rail siding near Skunk Ridge, Utah.

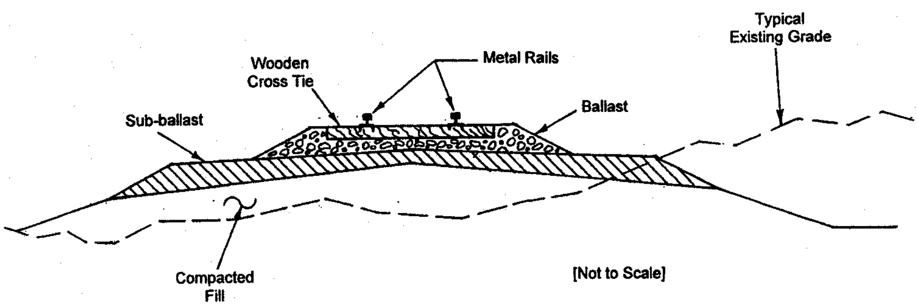

Figure 2.5. Typical cross-section for proposed new rail corridor.

The rail line would cross 32 arroyos (i.e., gullies or gulches cut by ephemeral streams) at which drainage culverts designed to the 100-year flood would be installed. The rail line would cross two improved gravel roads, as well as seven dirt roads and/or four-wheel-drive vehicle trails. At-grade crossings would be constructed so as not to impair travel on these roads and trails. The trains using the proposed new rail line would be limited to speeds of 32 km/hr (20 mph), and travel on the crossroads is extremely light; therefore, there would be no installation of such devices as lights or barriers. A standard, cross-buck railroad crossing sign would be erected at each grade crossing.

The rail line would not be fenced, and no access road along the rail line would be provided. Access for maintenance purposes would be accomplished by existing roads in the area and by railroad (i.e., hi-rail) vehicles moving along the track.

2.1.1.4 Land Use Requirements

Table 2.4 summarizes the amount of land potentially disturbed by the proposed activities to construct the proposed PFSF, the new access road to the proposed PFSF, and the new rail siding and new rail line. Land areas that would be disturbed at the location of the proposed PFSF and its access road would be on the Reservation, under the jurisdiction of the Skull Valley Band. (Title to the land is held by the United States in trust for the Band.) Land areas to be disturbed at the new rail siding would be managed by the BLM. In addition, the BLM manages the land that would be used for the new rail line between Skunk Ridge and the proposed PFSF.

Table 2.4 shows the amounts of land that would be cleared and revegetated after construction, as well as the amounts of land that would remain cleared for the life of the project.

Table 2.4. Potential land areas involved in construction of the proposed facility and the associated rail corridor

Facility/component	Hectares (acres) to be cleared	Hectares (acres) to be revegetated after construction	Hectares (acres) to remain cleared for life of project
Main facility[a] and access road[b] from Skull Valley Road	94 (232)	37 (92)[c]	57 (140)
New 51-km (32-mile) rail line[d] from Skunk Ridge to proposed PFSF on the Reservation	314 (776)	251 (621)	63 (155)

[a]Includes construction within the 40-ha (99-acre) restricted-access area and its fire barrier (crested wheatgrass) and perimeter road/isolation area, the PMF berms, and the storm water detention basin.

[b]Includes construction within the 82-ha (202-acre) right-of-way between the proposed facility and Skull Valley Road.

[c]Includes 100 m (300 ft) fire barrier around the outer edge of the perimeter road around the restricted-access area.

[d]Includes a new rail siding to be constructed within the 60-m (200-ft) right-of-way for the proposed new rail line at Skunk Ridge.

2.1.2 Operation

Construction of the first phase of the proposed PFSF is expected to be completed in 18 months, followed by commercial operations approximately 4 months later. Operation of the proposed PFSF, which would require a workforce of about 43 people, would involve receiving, transferring, and storing the SNF as described in the following subsections.

A general discussion of SNF transportation is provided below to give an overview of the complete operation. In addition to the operations described below for receiving SNF at the proposed PFSF, once DOE develops a permanent repository, operations would include transferring the stored SNF canisters to vendor-supplied, NRC-certified shipping casks and transporting them from Skull Valley to the DOE facility. (Shipping casks—unlike storage casks—would not be manufactured on site.) Shipments away from Skull Valley would be accomplished by reversing the order of operations used for the receipt of SNF at the proposed PFSF in Skull Valley.

2.1.2.1 Transportation of Spent Fuel to the Proposed PFSF

PFS proposes to use a dual-purpose canister system (see the discussion in the dialogue box in this section) to transport the SNF from PFS member companies and possibly other nuclear reactor locations (see Figure 1.3) to the proposed PFSF. The steel canister that contains the SNF is compatible with the HI-STORM 100 storage overpack (i.e. storage cask) to be used at PFS and the HI-STAR 100 transportation overpack (i.e. transportation cask) to be used for shipments between the originating power reactor generating company and PFSF. PFS plans to ship SNF from reactor sites to the proposed PFSF by railcar only. The sequence of operations is illustrated in Figure 2.6 and discussed in the following paragraphs.

At the originating reactor site, multiple SNF assemblies would be loaded into a metal canister, and the canister would be prepared for shipping (see Item Nos. 1 through 3 in Figure 2.6). This preparation includes surveying the canister for contamination, decontaminating as needed, filling the canister with helium, and then welding it shut (see Item Nos. 4 and 5 in Figure 2.6). The canister would then be placed into the Holtec International HI-STAR 100 transportation overpack [a certified shipping cask (see Item No. 6 in Figure 2.6) that is protected by impact limiters] loaded onto a shipping cradle, and then attached horizontally to a railcar for shipment to the proposed PFSF in Skull Valley (see Item No. 7 in Figure 2.6). The proposed shipping casks are made of steel and weigh up to 130 metric tons (150 tons) when loaded with the SNF and the canister. For reactor sites without direct rail access, the shipping cask would be loaded onto a heavy-haul vehicle or barge and transported to a nearby rail line where the cask would be loaded onto a railcar for transport to the proposed PFSF. If a reactor site cannot accommodate the shipping cask proposed by PFS, the reactor licensee would load SNF (in the SNF pool) into smaller “transfer” casks and then, using a dry transfer system, move the fuel from the smaller transfer casks into the larger shipping cask.

Because both the canister and HI-STAR 100 transportation cask will be submerged in the reactor spent fuel pool during loading, the exterior of the transportation cask (excluding impact limiters) and the canister may become contaminated with radionuclides. However, these areas would be decontaminated by the reactor licensee prior to shipment to PSF in accordance with transportation regulations. The HI-STAR 100 transportation cask is leak-tested prior to each shipment and is designed to prevent leakage even if the canister sealed within the cask is contaminated with radioactive material. The HI-STAR 100 transportation cask uses a bolted-lid overpack that is designed to meet all NRC regulatory requirements and prevent leakage of radioactive material beyond allowable levels during transportation. Therefore, any unacceptable release to the environment during transportation to and from the proposed PFSF is precluded.

On average, approximately 150 (100 to 200) loaded shipping casks would be received at the proposed facility each year. Shipments would arrive at Skull Valley via one of the rail routes shown in Figure 2.7. For these shipments, PFS would use either of two, single-purpose, dedicated trains which would proceed from the originating reactor site directly to Skull Valley, Utah, stopping only for crew changes, refueling, and periodic inspections. If the proposed rail line to the facility is constructed, then on average, the proposed PFSF would receive one (or up to two) trains each week carrying two to four loaded shipping casks per train; however, up to six loaded shipping casks per train could be accommodated by the proposed single-purpose trains. PFS has committed to complying with the Association of American Railroads’ (AAR’s) “Performance Standard for Spent Nuclear Fuel Trains.”

Transport to the proposed PFSF from the main line of the Union Pacific rail system would be done by rail using the proposed Skunk Ridge rail line described in Section 2.1.1.3. A minimum of two fleets of three to six railcars each would be used under the rail option. Shipping casks would not be removed from the railcars when they reach the proposed Skunk Ridge siding. Rather, the railcars containing shipping casks would be moved by locomotives along the new rail line to the proposed PFSF. Generally, one (or possibly two) such round-trips would be scheduled each week. Two personnel would be required to operate the locomotives and perform the necessary coupling and uncoupling operations at the new rail siding.

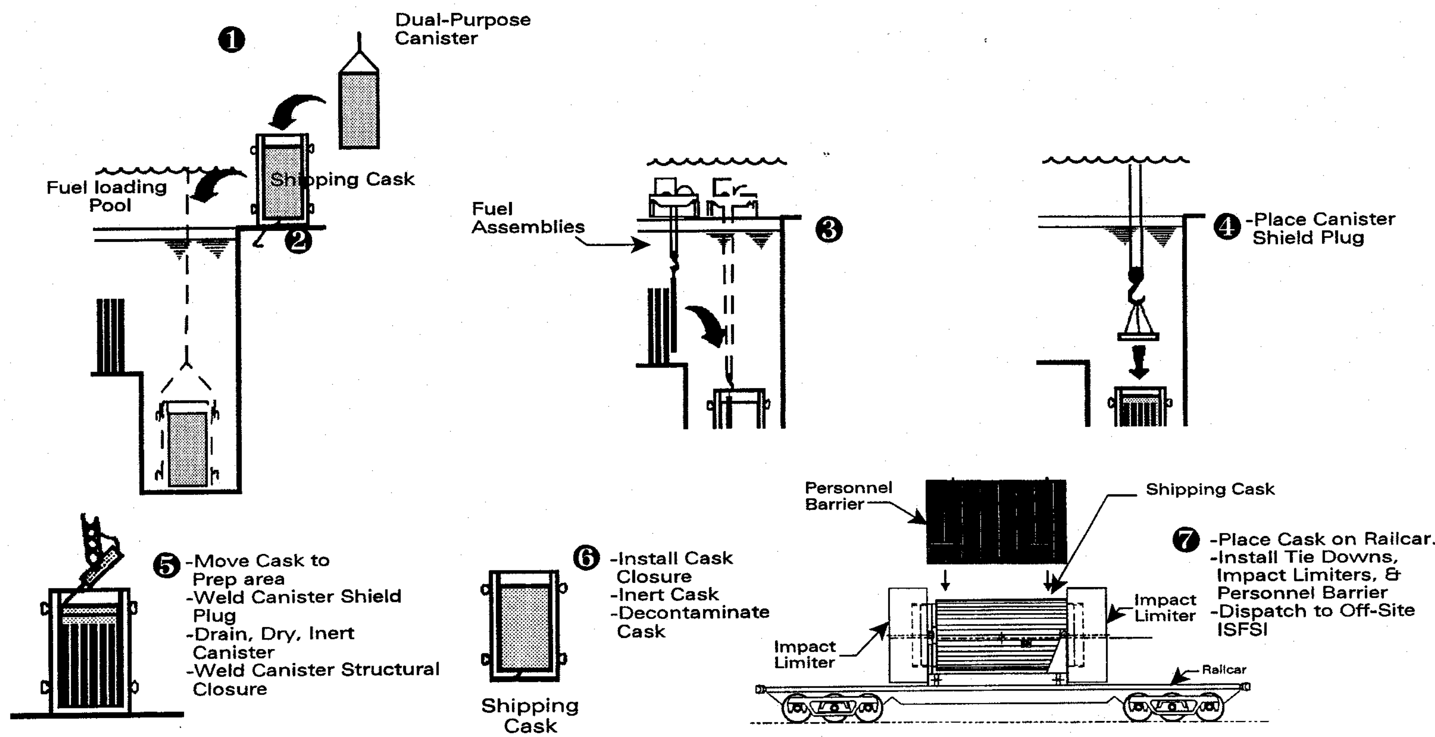

Figure 2.6. Sequences of canister handling and transfer operations for the movement of spent nuclear fuel at existing reactor sites.

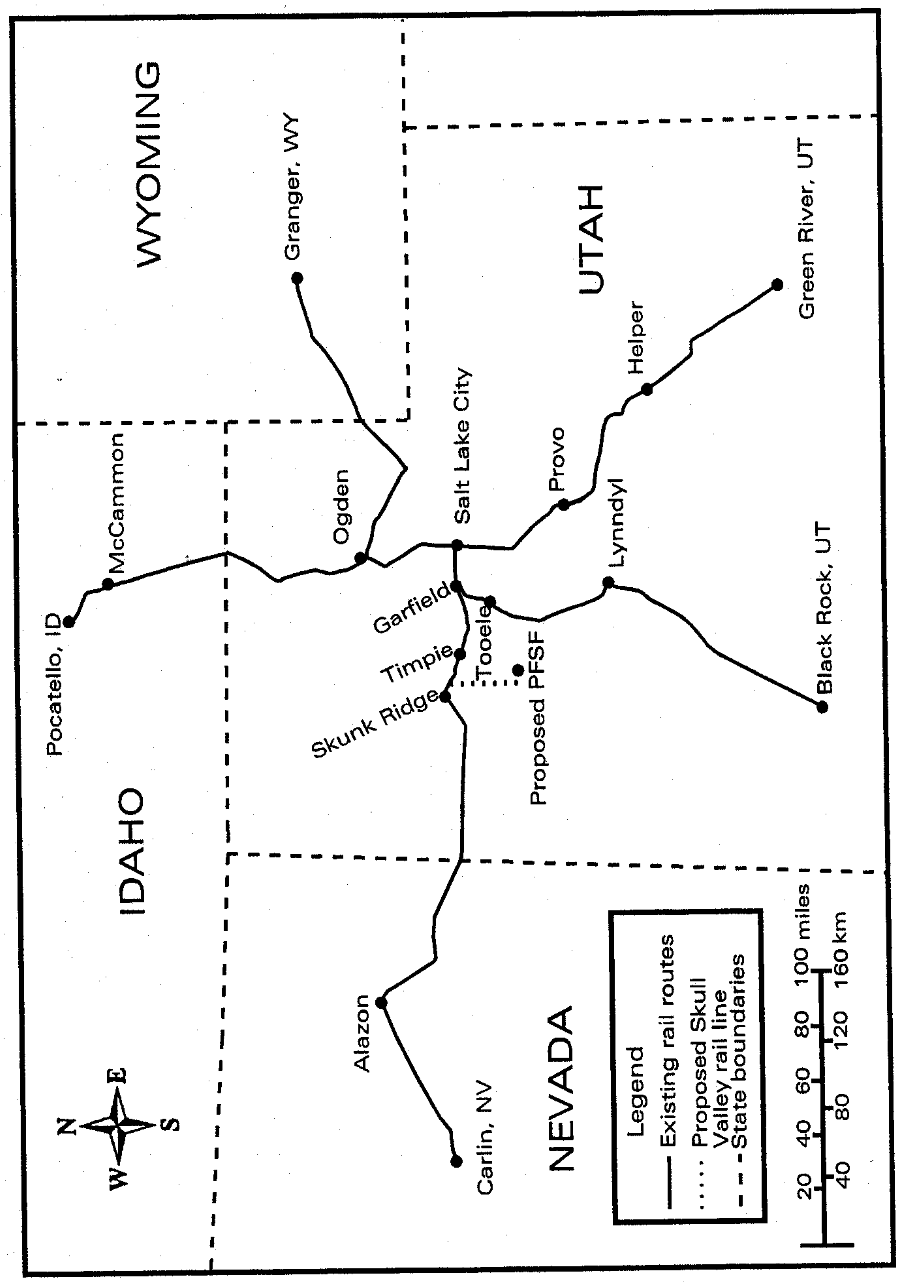

Figure 2.7. Potential rail routes for shipping spent nuclear fuel to Skull Valley, Utah.

PFS would employ a "start-clean/stay-clean" philosophy, meaning that the proposed PFSF would be intended to be a radiological contamination-free site. Operating under the start-clean/stay-clean philosophy, PFS would require that once a railcar arrives at the PFSF site, the shipping cask, impact limiters, and shipping cradle would be visually inspected. Personnel would then transfer the shipping cask into a designated area for radiological monitoring.

After the receipt is complete, the railcars carrying the shipping casks would be pushed by locomotive into the Canister Transfer Building, where the shipping casks would be removed from their railcars by crane (see Item No. 1 in Figure 2.8), turned to a vertical position, and moved into a transfer cell (see Item No. 2 in Figure 2.8). Inside the transfer cell, the shipping cask and the storage cask would sit side by side (see Figure 2.8). The top of the shipping cask would be unbolted, removed, and set aside. Once the lid of the shipping cask is removed, the canister is surveyed for radiological contamination to assure it meets PFSF acceptance levels. In the unlikely event the canister is found to be contaminated above acceptable levels, PFS intends to close the lid of the HI-STAR 100 transportation overpack (i.e., shipping cask) and return it to the originating reactor site. As stated above, the HI-STAR 100 transportation cask uses a bolted-lid overpack that is designed to meet all NRC regulatory requirements and prevent leakage of radioactive material beyond allowable levels during transportation.

In accordance with NRC and DOT regulations, the HI-STAR 100 transportation cask will be surveyed prior to transport from the proposed PFSF to assure that all transportation standards, including radiological contamination and dose limits, are satisfied. The transportation cask can only be shipped if it satisfies all appropriate NRC and DOT regulations. If necessary, PFS will decontaminate the exterior of the transportation cask to levels below regulatory limits prior to shipment back to the originating reactor for future use. However, the exterior of the HI-STAR 100 transportation cask is unlikely to be contaminated because the cask is decontaminated at the reactor site prior to its shipment to the proposed PFSF and it should not be exposed to any external radioactive material during shipment or transfer at the proposed PFSF.

If the canister meets acceptable contamination levels, the single failure-proof crane would then pick up an open-bottomed, shielded transfer cask and move it into position over the shipping cask. The sealed SNF canister would be lifted out of its shipping cask into the transfer cask. The crane would be used to move the transfer cask (with the SNF canister inside) from the top of the shipping cask to the top of the storage cask (see Item No. 3 in Figure 2.8).

Once the transfer cask is in position above the storage cask, the canister would then be lowered from the transfer cask into the storage cask (see Item No. 4 in Figure 2.8). A lid would be placed and bolted on top of the storage cask prior to moving the cask onto a storage pad (see Item No. 5 in Figure 2.8).

A specially designed storage cask transporter, equipped with a 180-metric-ton (200-ton) hydraulic lifting beam and rolling tracks (see Figure 2.9), would be used to move each storage cask from the Canister Transfer Building onto the storage pads.

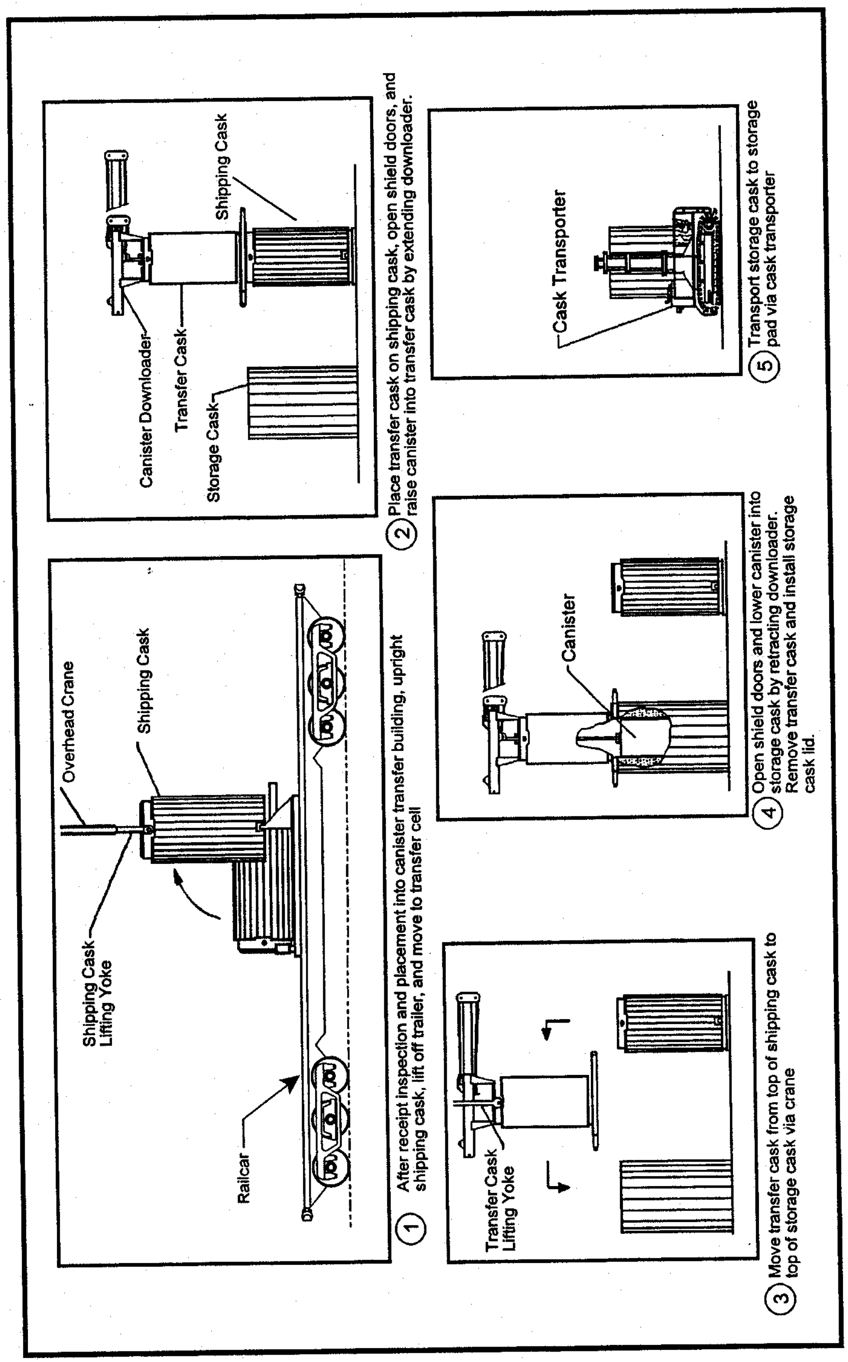

Figure 2.8. Transfer operations for spent nuclear fuel (inside sealed canisters) at the proposed PFSF.

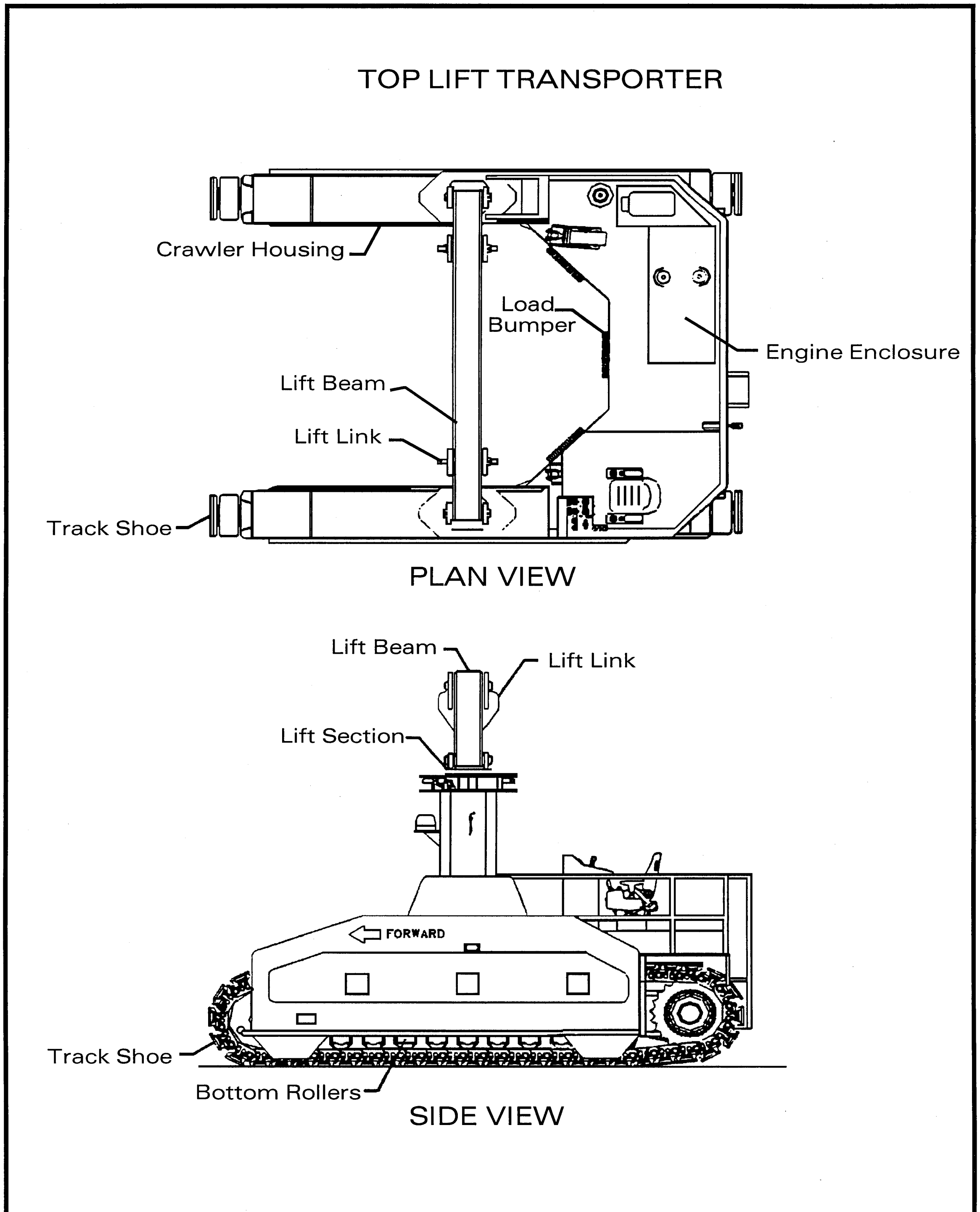

Figure 2.9. Type of storage cask transporter proposed for use at the PFSF.

CONTAINERS FOR SPENT NUCLEAR FUEL

Several types of containers for spent nuclear reactor fuel are discussed in this FEIS. These include:

Canisters are thick-walled, steel cylinders used to package and contain SNF assemblies. Canisters are hermitically sealed by welding them shut. This FEIS discusses “dual-purpose canisters” that can be used for both shipping and storing of SNF. That is, once the SNF is sealed into the dual-purpose canister, it would not need to be removed from the canister during interim storage.

Shipping Casks are thick-walled, steel cylindrical packages certified by the NRC to transport SNF.

Transfer Casks are radiation-shielded, open-bottomed cylinders used to transfer SNF canisters from shipping casks into storage casks. All transfer operations would be conducted inside a special room, or “transfer cell,” within a closed building.

Storage Casks are thick-walled , steel or steel and concrete containers certified by NRC for storing SNF. The types of storage casks discussed in this FEIS are vertical, cylindrical structures that provide radiological shielding. They are equipped with vents and channels that provide cooling by passive, natural convection processes; hence, they require very little maintenance other than periodic inspections. They are sometimes called “dry casks” because no cooling water is required.

2.1.2.2 Proposed Storage Cask System

The storage casks provide structural support for the canisters, physical protection, radiation shielding, and passive natural convection for cooling to remove decay heat while in storage. During storage, temperatures of the casks would be monitored, and periodic surveillance of the casks for vent blockage would be conducted on the basis of the requirements of the NRC license for the proposed PFSF.

PFS expects that its proposed dual-purpose canister system would be compatible with DOE's plans for placement in a permanent repository. When a DOE permanent repository becomes available, the stored SNF would be moved from the storage pads in Skull Valley and transferred to shipping casks following the same transfer operations described above but in reverse order. Shipment of SNF away from the proposed PFSF could occur at anytime during the term of the PFSF license once a permanent repository becomes available. As discussed in Chapter 8 of this EIS, under the NRC license the maximum amount of SNF that the applicant could accept at the proposed PFSF over the term of the license is 40,000 MTU (44,000 tons) of SNF. Once the applicant has accepted 40,000 MTU of SNF, the applicant may not accept any additional SNF shipments, even if the applicant has begun to ship SNF off site (as proposed in the lease between PFS and the Band).

PFS intends to operate the proposed PFSF for up to 40 years (i.e., an initial 20 year license and a 20 year renewal). The proposed PFSF would be designed to store up to 40,000 MTU (44,000 tons) of SNF from U.S. commercial reactors. While at the proposed PFSF, the SNF would remain the property of the originating power reactor generating company. The service to be provided by PFS under the terms of the proposed lease would be storage only, and all SNF would be removed from the proposed PFSF before completion of decommissioning. Consistent with the NRC's Waste Confidence Decision (see Section 1.3), by the end of that period, it is expected that a permanent repository would be available to receive the SNF from the proposed PFSF. In any event, should the NRC grant the application, service agreements (i.e., contracts) between PFS and companies storing SNF at the proposed PFSF will require that the originating companies, which own the SNF, remove all SNF from the proposed PFSF by the time PFS has completed its licensing or regulatory obligations under its NRC license. The service agreement requirement to remove the SNF from the proposed PFSF is not dependent upon the availability of a permanent geological repository. Therefore, if the PFS license is terminated before a permanent geological repository becomes available, the companies storing SNF at PFSF would continue to retain responsibility for the fuel and would be required to remove it from the proposed PFSF site.

The cask system being considered for use at the proposed PFSF is the Holtec International HI-STORM system (see Figure 2.10). The cask supplier would be responsible for design and certification by NRC of the canisters, casks, and transfer equipment. The characteristics of the HI-STORM canister and storage cask are shown in Tables 2.5 and 2.6, respectively. More detailed descriptions of the specifications for the cask, canister, and canister transfer operations may be found in Chapters 4 and 5 of the SAR and the NRC's SER, as updated.

2.1.3 Emissions, Effluents, and Solid Wastes

Atmospheric emissions (e.g., dust and vehicle exhaust) would be generated by the soil-disturbing activities associated with site preparation and construction of the storage area, the access road, the new rail siding and the new rail line. However, few atmospheric emissions are anticipated during the

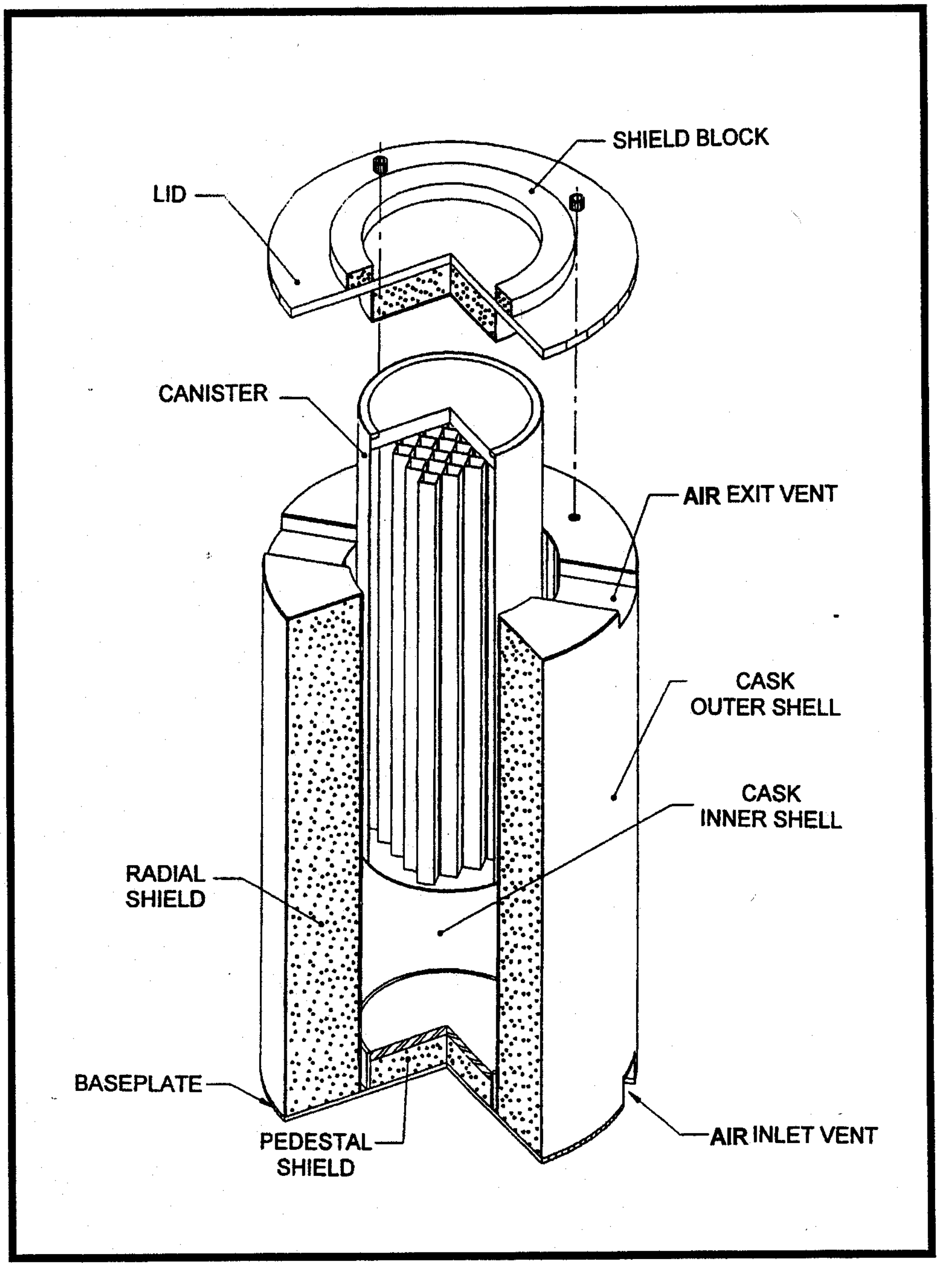

Figure 2.10. HOLTEC Hi-Storm® storage cask. Note: Air inlets and outlets would be covered by wire mesh.

Table 2.5. Characteristics of the HI-STORM canister

Parameter	Value
Outside diameter	1.7 m (5.7 ft)
Maximum length	4.8 m (15.9 ft)
Capacity	24 PWR[a] assemblies ***or*** 68 BWR[b] assemblies
Maximum heat load	20.88 kW for PWR canister 21.52 kW for BWR canister
Material of construction	Stainless steel
Maximum weight (loaded with SNF)	PWR: 36.3 MT (40.0 tons) BWR: 39.6 MT (43.6 tons)
Internal atmosphere	Helium

[a]PWR = Pressurized water reactor
[b]BWR = Boiling water reactor

Source: PFS/SAR 2001; Table 4.2-1

facility's operation. Those anticipated emissions would come from vehicles involved in transporting and transferring shipping casks, storage casks and liners, and personal cars for workers commuting to the facility. In addition, emissions would be released from the concrete batch plant, which would continue operations throughout the life of the proposed PFSF to provide concrete for the storage pads and storage casks.

The only liquid effluents that would be generated at the facility are stormwater runoff that would be directed to the detention basin and the natural drainage system, and domestic wastes that would be fed into the facility's septic system. Stormwater runoff is not expected to contain any radiological effluents since PFS intends to employ a "start clean/stay clean" philosophy. PFS has stated that it would employ "best management practices" (BMPs) to minimize atmospheric emissions and liquid effluents (see Section 2.1.4).

Drain sumps would be provided in the cask load/upload bay of the Canister Transfer Building. These sumps would catch and collect any water that drips from the shipping casks (e.g., from rainfall or melting snow) onto the floor. Water collected in these drain sumps would be sampled and analyzed to verify it is not radioactively contaminated prior to its release. In the event that contaminated water is detected, it would be collected in a suitable container, solidified by the addition of an agent (such as cement) so that it would constitute solid waste, staged in a low-level waste holding cell while awaiting shipment offsite, and then transported to a licensed low-level waste disposal facility.

The proposed PFSF is intended to be a zero-release facility. Nevertheless, solid dry low-level radioactive waste (e.g., smears, disposable clothing) could be generated while performing health physics surveys. These wastes would be collected, identified, packaged in low-level waste containers marked in accordance with the requirements of 10 CFR Part 20. These wastes would then be

Table 2.6. Characteristics of the HI-STORM storage cask system

Parameter	Value
Height	6.1 m (20.0 ft)
Outside diameter	3.4 m (11.0 ft)
Capacity	1 canister, loaded with approximately 10 MTU of SNF
Maximum radiation dose rate	
1 m (39 inches) from surface:	
Side	17 mrem/hr
Top	2 mrem/hr
On contact with surface:	
Side	35 mrem/hr
Top	5 mrem/hr
Top vents	9 mrem/hr
Bottom vents	15 mrem/hr
Material of construction	Concrete (core and lid) Steel (liner and shell)
Maximum weight (empty)	121.7 MT (134.2 tons)
Maximum weight (loaded with single SNF canister)	PWR[a]: 158.0 MT (174.2 tons) BWR[b]: 161.3 MT (177.8 tons)
Service life	More than 100 years

[a]PWR = Pressurized water reactor fuel assemblies inside canister.
[b]BWR = Boiling water reactor fuel assemblies inside canister.

Source: PFS/SAR 2001; Table 4.2-2.

temporarily stored in the holding cell of the Canister Transfer Building while awaiting shipment to a licensed offsite low-level radioactive waste disposal facility. No other radioactive wastes are expected from the proposed facility.

Other solid wastes, such as office or paper trash and lunchroom wastes, would be collected and disposed of as garbage at an off-site commercial location.

2.1.4 Best Management Practices

Best management practices (BMPs) are defined in both Federal and state regulations. EPA's definition is contained in 40 CFR 122.2, which consists of regulations that address the management of practices that could create water pollution. This definition states:

> *Best Management Practices, "BMPs," mean schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of*

> *"waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.*

This definition is also used by the State of Utah in its Department of Environmental Quality's Stormwater General Permit for Construction Activity, Part VII. PFS has expanded the above definition and has committed to management practices that include additional pollution prevention measures. These management practices address the protection of surface waters, the preservation of existing air quality, and the prevention of erosion of the surface soils during construction of the proposed PFSF. The additional pollution prevention measures are listed in Table 2.7

2.1.5 Monitoring Programs

PFS would establish a pre-operational radiological environmental baseline to characterize the existing background levels of radiation. The baseline would include sampling for radioactivity in soil, groundwater, vegetation, and in the flesh of non-migrating animals near the proposed PFSF site. An on-going monitoring program is not necessary since the operating storage facility has no effluents that could carry radioactivity into the environment. One exception is the monitoring of water collected in drain sumps in the Canister Transfer Building (see discussion in Section 2.1.3).

Airborne monitoring (by continuous radiation air monitors) would be performed by PFS inside the Canister Transfer Building during SNF transfer operations. The building would also use area radiation monitors for recording the general building doses during canister transfer operations.

Workers at the facility would be monitored and their accumulated doses would be administratively controlled to maintain such doses within NRC regulatory limits. Monitoring of off-site individuals is not planned; however, radiation monitors [i.e., thermoluminescent dosimeters (TLDs)] would be used along the boundaries of the restricted-access area and the OCA to record radiation levels. The primary purpose of the TLDs is to monitor the direct radiation emanating from the storage casks.

To minimize the likelihood that animals could spend extensive periods of time near to the storage casks, PFS would implement monitoring and take other actions to deter animals from entering the restricted-access area. PFS would monitor for signs of any on-site wildlife activity and would take measures to prevent habitation. Small mammals and reptiles would be kept from the area by using traps, if necessary to safely capture and remove the animals. The entire facility would be surveyed by workers. If any signs of wildlife habitation are found, actions would be taken immediately to remove the animals.

An on-site meteorological monitoring program has already been established by PFS. The intent of this program is to collect data for the characterization of the local meteorology and not for radiological dispersion calculations.

At the completion of the project, the BLM right-of-way grant would require PFS to develop and implement a sampling program, either at various points along the proposed rail line right-of-way or at the proposed ITF (see Section 2.2.4.2) to assure there is no contamination. Prior to releasing the right-of-way, BLM would also require PFS to provide sample results and written certification from the NRC and the Utah Department of Environmental Quality, Division of Radiation Control that the proposed ITF or the proposed rail line right-of-way is free from radiological contaminants.

Table 2.7. Best management practices as proposed by PFS during the construction of the PFSF

Construction activity	Minimum controls or BMPs to be implemented
PFSF Site	
Construction of the flood diversion berms	Drainage ditches will be stabilized and lined with rock aggregate/rip-rap to reduce flow velocity and prohibit scouring.
Containment of sediment-ladened stormwater runoff during grading and construction	A large stormwater infiltration basin (i.e., detention basin) will be constructed at the site during the initial phase of construction to collect the majority of runoff from the construction site. The basin will be designed to capture the 100-year storm event and will be equipped with a stilling basin and an emergency overflow constructed of stabilized non-erodible material. Any solids collected within the runoff entering the basin will settle out and the water will either evaporate or will provide groundwater recharge.
Dissipation of stormwater runoff routed around the facility boundary	Flow dissipaters will be installed at each diversion channel to further reduce the velocity of the stormwater sheet flow. At a minimum, these devices will be constructed of rip-rap.
Stabilization of disturbed soils around the concrete SNF storage pads	Disturbed soils around each concrete storage pad will be permanently stabilized with a layer of limestone aggregate.
Stabilization of disturbed soils around the four buildings proposed for the site	Silt fencing and sediment traps will be installed where appropriate. The construction roads will be periodically watered down to control fugitive dust emissions.
PFSF Access Road Construction	
Construction of the flood diversion berm	The flood diversion berm constructed perpendicular to the site access road will be stabilized and lined with rock aggregate/rip-rap to reduce flow velocity and prevent scouring. If necessary, a stormwater flow dissipation device will also be placed where the diversion berm redistributes meteoric flow .
Grading and construction	Silt fencing and sediment traps will be installed where appropriate. The construction road will be periodically watered down to control fugitive dust emissions. Stone construction pads will be placed at the entrance/exit point-of-access roads to avoid excessive tracking of dirt and sediment onto county or state highways. Where appropriate, external vehicle washing (without the use of detergents) will be performed on-site, if it becomes necessary.
Fugitive dust controls	Construction road watering trucks will be used to periodically wet active construction road surfaces; stone construction entrance pads will be placed at construction road egress points to avoid excessive sediment tracking onto county or state roadways.
Drainage way construction	Box culverts will be placed at select locations under the access road entering the site. Rip-rap or other flow dissipation devices will be placed at the culvert where water is dissipated and silt fencing and/or sediment traps will be employed were appropriate.
Rail Access Corridor from Skunk Ridge	
Grading and construction	Silt fences and sediment traps will be installed where appropriate. Disturbance of soils will be limited to the extent practicable. Soils immediately around the rail line will be stabilized with crushed aggregate.
Stabilization of soil stockpiles associated with cut-and-fill operations	Soil stockpiles generated during the construction of the rail corridor will be placed in a manner to reduce erosion, and down-gradient areas will be protected by silt fencing. Temporary seeding or additional temporary soil stabilization measures will be applied, if necessary.

Table 2.7. Continued

Construction activity	Minimum controls or BMPs to be implemented
Arroyo crossings	Culverts will be placed in drainage ways along the rail corridor and will be designed to convey the runoff from a 100-year storm. In addition, stone aggregate or other flow dissipation devices will be placed to reduce stormwater velocity and minimize erosion. Sideslope soil stabilization devices, including silt fencing and aggregate, will be used where appropriate.
Universal Housekeeping BMPs	
All	Construction equipment maintenance and repair will be designated and controlled to prevent the discharge of oils, grease, hydraulic fluids, etc.
All	Waste receptacles and/or trash dumpsters will be placed at convenient locations for the regular collection of waste. Where practicable, materials suitable for recycling will be collected.
All	If external washing of construction vehicles is necessary, no detergents will be used, and the runoff will be captured in a sediment trap.
All	Adequately maintained sanitary facilities will be provided for all construction crews.

Source: PFS/ER 2001; Table 9.1-1.

2.1.6 Facility Closure and Decommissioning

At the end of its useful life (or upon termination of the lease with the Skull Valley Band or termination of the NRC license, whichever comes first), the proposed PFSF would be closed. As a condition of the lease with the Skull Valley Band and as required by NRC regulations, decommissioning of the proposed PFSF would be required prior to closure of the facility and termination of the NRC license. The objective of the radiological decommissioning would be to remove all radioactive materials having activities above the applicable NRC limits in order for the site to be released for unrestricted use. The NRC license would also contain requirements and provisions for assurance from PFS prior to and during operations that sufficient funds would be available at the end of the project's life to cover the costs of decommissioning activities. A "decommissioning fund" would be established by PFS prior to commencing operations in conjunction with the "per item" costs for receiving and storing each SNF canister. At the option of the Skull Valley Band, non-radiological decommissioning and restoration of the facility may include the removal of structures and reasonably returning the land to its original condition.

A Preliminary Decommissioning Plan is contained in Appendix B of the license application for the proposed PFSF. Because the exact nature of decommissioning cannot be predicted at this stage of the project, the information presented below represents the best available conceptual description of the activities envisioned for decommissioning of the proposed PFSF. A Final Decommissioning Plan would include information on site preparation and organization; procedures and sequences for removal of systems and components; decontamination procedures; design, procurement, and testing of any specialized equipment; identification of outside contractors to be used; procedures for removal and disposal of any radioactive materials; and a schedule of activities. The Final Decommissioning Plan must be submitted to the NRC for review and approval. This approval process would require its own environmental review under NEPA that would result in an environmental assessment or environmental impact statement as appropriate. 10 CFR 72.54(g)(1) to (6) delineates the requirements for the Final Decommissioning Plan.

The principal activities involved in decommissioning would include: (1) removal of all remaining SNF from Skull Valley, (2) the removal or disposition of all storage casks, (3) the removal or disposition of the storage pads and crushed rock, and (4) the removal of the buildings and other improvements or their transfer to the Skull Valley Band. These activities are described in detail in the following paragraphs.

The SNF contained inside sealed metal canisters (see Section 2.1.2.2) would be transferred into licensed shipping casks for transportation away from Skull Valley. The fuel assemblies would remain inside these sealed canisters such that decontamination of the canisters is not expected to be necessary. Decommissioning activities would then be limited to radiological surveys and any necessary decontamination of storage casks, storage pads, or building structures. It is not anticipated that the storage casks or pads would have residual radioactive contamination because (a) the SNF canisters would remain sealed while in Skull Valley, (b) the canisters would be radiologically surveyed at the originating reactor and again once they arrive at the proposed Skull Valley facility to ensure that there is no radiological contamination, and (c) the neutron flux levels generated by the SNF would be sufficiently low that activation of the storage casks and pads would produce negligibly small levels of radioactivity, if any.

2.1.6.1 Storage Cask Decommissioning

Following the removal of the canisters containing SNF, the empty storage casks would be surveyed to determine their levels of residual radioactivity. If the contamination levels were found to be below the applicable NRC limits for unrestricted release, then the empty storage casks would be disposed of as non-controlled material. Any contaminated storage casks would be decontaminated to levels below applicable NRC limits for unrestricted use. The fate of these items would be identified as part of the Final Decommissioning Plan.

Any empty storage casks with contamination or activation levels above applicable NRC limits for unrestricted release would be dismantled, and the contaminated or activated portions would be segregated and disposed of at a low-level waste facility. The portions or components of any such storage cask which are below the applicable NRC limits for unrestricted release would be disposed of as non-controlled material.

Storage cask decontamination and decommissioning could be performed at any time following the removal of the SNF canister; thus, storage cask decommissioning efforts could essentially be complete by the end of operations to ship the canisters off-site. The shipping casks and transfer casks (see Section 2.1.2.2) would be similarly decommissioned after they are no longer required for facility operations.

2.1.6.2 Storage Pad Decommissioning

A major portion of decommissioning would involve the disposition of the storage pads. There would be a maximum of 500 storage pads, each having a surface area of 20 by 9 m (67 by 30 ft) and a depth of 0.9 m (3 ft). PFS has identified two alternatives for decommissioning the storage pads for unrestricted use: (1) the storage pads could be left in place, and the storage area could be covered with topsoil and replanted or (2) they could be excavated, cut into smaller sections, and trucked off-site for disposal (PFS/ER 2001). The decision to leave or remove the storage pads will be made by the Skull Valley Band and the BIA prior to decommissioning of the pads. The decommissioning of the storage pads will be addressed in further NEPA review by the BIA before its approval of the Nonradiological Decommissioning Plan to be provided by PFS under the proposed lease.

In accordance with the "start-clean/stay-clean" philosophy for the proposed PFSF, the concrete storage pads are not anticipated to become radioactively activated or contaminated. However, for the purpose of assessing the impact of any decommissioning activities, PFS assumed in its license application that up to 10 percent of the total storage pad area would require surface decontamination. The maximum total surface area of the 500 pads would be 93,400 m^2 (1,005,000 ft^2). The assumed decontamination of 10 percent of this area [i.e., 9,340 m^2 (100,500 ft^2) to be decontaminated] would produce about 8.5 m^3 (300 ft^3 or 11 yd^3) of low-level waste (PFS/LA 2001, Appendix B, "Preliminary Decommissioning Plan"). This contaminated material would be collected, packaged, and disposed of at a low-level waste facility.

In the event that the storage pads are removed in their entirety, approximately 85,500 m^3 (112,000 yd^3) of material would need to be removed and disposed of. The estimated number of truckloads [with each truck hauling 15 m^3 (20 yd^3)] needed to remove this material would be about 6,200, when a factor of 0.9 is included to account for void spaces among the pieces of sectioned pads.

2.1.6.3 Decommissioning of Buildings, Structures, and Other Improvements

The future of the buildings and other improvements to be constructed by PFS on the Reservation is to be determined by the Skull Valley Band and the BIA. PFS is obligated to remove the buildings and other improvements at the request of the Skull Valley Band. PFS will collect sufficient advanced funding to accomplish any or all of the building removals. If the Band chooses to retain any or all of the buildings and other improvements once the radiological decommissioning is completed, it has the right to receive a transfer from PFS in an "intact" condition. The future use of any buildings and other improvements not removed by PFS would be at the discretion of the Band, and any impacts associated with such use is beyond the scope of this FEIS. The decommissioning of buildings and other improvements will be addressed in further NEPA review by the BIA before its approval of the Nonradiological Decommissioning Plan to be provided by PFS under its proposed lease.

The fences and peripheral structures are not expected to become contaminated. Therefore, it is expected that they would not require decontamination or special handling and would be removed or left in place as determined by the Skull Valley Band.

Upon expiration of the right-of-way, the rail line would be removed and reclaimed in accordance with the Plan of Development and right-of-way grant from the BLM. This plan calls for a radiological survey, as described in Section 2.1.5, and the removal of rail and ballast. Once the rail and ballast are removed, the remainder of the grade would have to be recontoured and reseeded. PFS would also need to file an application for abandonment authority with the STB. The STB would review the proposed abandonment and conduct an environmental review under NEPA.

If for any reason during the term of the BLM's right-of-way grant, the right-of-way is no longer needed for the purpose for which it was issued, the BLM retains the right to require implementation of the reclamation plan. The BLM may also consider the assignment of the right-of-way to another qualified entity. Another consideration may be to reduce the level of reclamation to allow an alternative use such as converting rails to trails. If the rail line is still needed after the initial term of the right-of-way grant, PFS may apply for renewal under the terms and conditions imposed by the BLM.

2.2 Alternatives

This section examines the alternatives considered for the proposed action described in Section 2.1. The range of alternatives was determined by considering the underlying need and purpose for the proposed action. From this analysis, a set of reasonable alternatives was developed and the impacts of the proposed action were compared with the impacts that would result if a given alternative was implemented (see the comparative summary of impacts in Chapter 9).

The range of alternatives addressed in this FEIS is based upon PFS's needs (as described in Section 1.3) and upon the Skull Valley Band's need for economic development (see Section 1.5.2). These alternatives cover (a) the facility, (b) the alternative technologies available for an operational ISFSI, (c) the alternative locations for an ISFSI, (d) the transportation options for moving SNF to the site of the proposed PFSF in Skull Valley, and (e) a "no-action" alternative under which the proposed PFSF would not be built. Sections 2.2.1 through 2.2.5, respectively, discuss these alternatives in detail.

2.2.1 Alternatives to the Proposed PFSF (Not Addressed Further in this FEIS)

The proposed PFSF is intended to satisfy the need for an interim facility that would provide a safe, efficient, and economical alternative to continued SNF storage at reactor sites (see Section 1.3). Other than at-reactor storage (in SNF pools or dry casks) no other SNF storage alternatives currently exist for most power reactor companies. Alternatives to the proposed PFSF include (1) a different privately owned away-from-reactor ISFSI, (2) shipment of SNF from reactors sites without sufficient storage space to reactor sites with additional SNF storage capacity, and (3) alternatives that, in effect, eliminate the need for the proposed PFSF. Each of these three alternatives is discussed below.

2.2.1.1 A Different Privately Owned ISFSI

Any away-from reactor ISFSI would be required to meet the requirements in 10 CFR Part 72. Other than the proposed PFSF, no other commercially owned away-from-reactor dry cask storage system ISFSIs are available or have been proposed. In July 1998, the NRC staff received correspondence that indicated that the Owl Creek Energy Project intended to submit an application for an away-from-reactor ISFSI by the fourth quarter of 1999. The Owl Creek Project indicated that the application would propose siting the ISFSI in Fremont County, Wyoming, and would adopt the DOE's Central Interim Storage Facility (CISF) design. To date, the Owl Creek Energy Project has not submitted an application and no pre-application meetings have been conducted. Additionally, the NRC received an application submitted on October 19, 1998, from P&A Engineering for a license for the Pigeon Spur Fuel Storage Facility in Box Elder County, Utah. On January 8, 1999, the NRC staff informed the sponsor of the Pigeon Spur Fuel Storage Facility that its application was insufficient for review in accordance with 10 CFR Part 72. As a result, the NRC staff rejected the application and no further review of that application has taken place.

Because these additional facilities are not currently available for use, and no application is currently under review for such facilities, the NRC staff considers these as alternatives that are not reasonable;

and, therefore, they are not analyzed in detail in this EIS. As discussed in Chapter 7, the NRC staff evaluated the applicant's site selection process to determine if a site considered by the applicant was obviously superior to the proposed site. The location proposed by Owl Creek Energy Project is within the same geographic region as the PFS alternate site location discussed in Chapter 7. The location of the Pigeon Spur site was not one of the candidate sites considered by the applicant, and is not considered herein. Neither the applicant nor the Cooperating Federal Agencies are required to consider every possible site, but only to give appropriate consideration to alternate sites.

2.2.1.2 Shipment of SNF Between Reactor Sites

This alternative would require, in most cases, that a reactor licensee agrees to receive another reactor's SNF. To date, NRC has issued licenses to two reactor licensees to transfer SNF from one reactor site to another for storage of SNF. In each case, the receiving and shipping reactor sites were owned by the same company. No reactor licensees have requested approval from NRC to accept SNF from a reactor site owned by another company, and no proposals for such requests have been identified to date. NRC approval would be needed before a reactor site could store SNF from another site. In most cases, a license amendment would be required, and the license amendment process would include a NEPA review. For the following reason, it is unlikely that this alternative would provide sufficient capacity to satisfy the interim SNF storage needs for the PFS members or the industry: all operating reactors continue to reduce their unused spent fuel pool storage capacity with each refueling outage, and no reactor licensee has identified an interest in receiving SNF from other companies for storage. Accordingly, this is not considered to be a reasonable or feasible alternative.

The environmental impacts of this alternative would depend upon site-specific considerations related to any particular proposed transfer, and the particular transportation impacts that might result. Without identifying specific reactor sites that might be involved in this alternative, the discussion of cross-country transportation impacts in Section 5.7 provides a reasonable discussion of the potential transportation impacts. For the reasons discussed above, this alternative was not evaluated in detail in this FEIS.

2.2.1.3 Alternatives That, in Effect, Eliminate the Need for the Proposed PFSF

The need for the facility could be eliminated by the Federal Government taking possession and title to the SNF at all reactor sites and ISFSIs in a manner that would allow sufficient on-site storage to be maintained. This would allow plant operations to continue and would allow decommissioning to be completed for reactors that have already been shutdown.

During a Congressional hearing before the Subcommittee on Energy and Power in 1999, the Secretary of Energy presented a proposal that would have the Federal Government take title to utilities' SNF at reactor sites until a repository is opened. The Secretary of Energy stated that "the Department is only at the beginning of the process of analyzing this approach and discussing it with the utility industry and other parties." The proposal, as presented to date, would be very similar from an environmental standpoint to the no action alternative (see Section 2.2.5), in that the SNF would remain at each reactor site. However, the Secretary also stated that " we would still have to address a range of issues, including liability, financial and operational responsibilities." With such critical issues still being considered, and in the absence of further Government initiatives to advance this concept, the Secretary's proposal is not considered to be a candidate for evaluation as a reasonable or feasible alternative to the proposed action in Skull Valley; hence, no such evaluation has been made in this FEIS.

On July 19, 2000, DOE and Philadelphia Electric and Gas Company (PECO) amended the Peach Bottom contract for disposal of SNF and/or high-level radioactive waste.[2] The amendment added a provision that would allow PECO to transfer title of the Peach Bottom storage casks and ISFSI to the DOE. Some key terms and agreements of the title transfer still need to be finalized if the contract provision is to be executed, such as the issues of liability, and DOE's legal authority to take title to the Peach Bottom storage casks and ISFSI. Although this contract is in place, the NRC staff continues to believe that completion of a detailed analysis of this alternative would require speculation on some of its key aspects that continue to remain uncertain. Hence, no such evaluation of this concept has been made in this EIS.

2.2.2 Alternative Technology

2.2.2.1 Dry Storage Systems

PFS identified five types of SNF dry storage systems (see the dialogue box in this section) for use at the proposed PFSF, which are (1) single-purpose cask systems, (2) single-purpose canister systems, (3) dual-purpose cask systems, (4) dual-purpose canister systems, and (5) modular vault dry storage systems (PFS/ER 2001). PFS indicated that it selected the dual-purpose canister system described in Section 2.1 for the following reasons. First, it eliminates the need to handle or expose individual SNF assemblies during transfer after a canister is loaded and sealed at the originating power reactor; and second, the use of the proposed dual-purpose canisters system, with separate transportation and storage overpacks (i.e., casks) for the canister, costs less than a dual-purpose cask system with a single cask for both transportation and storage, because each storage cask does not need to be licensed and built to meet 10 CFR Part 71 transportation requirements.

The other dry storage systems would be constructed of materials similar to those used for the proposed system and SNF would have to be transported to the proposed PFSF site in a manner similar to the PFS proposal. The other dry storage systems would be required to meet the standards set forth in 10 CFR Part 72, and the environmental impacts would not be significantly different from those associated with the proposed system. Accordingly, this FEIS does not include a detailed evaluation of other current dry storage system designs.

2.2.2.2 Wet Storage Systems

The NRC staff considers both wet and dry storage of SNF storage to be safe. The regulations in 10 CFR Part 72 govern the design and operation of wet and dry SNF storage systems. A wet ISFSI would require packaging of the fuel at the reactor site for shipment, unpackaging of the SNF at the ISFSI site, and placement of the SNF into a storage pool. Currently, DOE plans to employ dry cask storage technology at a permanent repository; therefore, it would be necessary for SNF stored at a wet ISFSI to be packaged again prior to shipment to a permanent repository. In addition, a wet ISFSI would require more operational, maintenance, and surveillance activities to maintain its safety than a dry-cask storage system, which relies on passive features to maintain cooling and radiation shielding. The additional packaging of the SNF and operational, maintenance, and surveillance activities would

[2] All utilities have contracts with DOE for disposal of SNF and/or high level radioactive waste. These contracts are consistent with the model contract in 10 CFR Part 961.

Generic Types of Dry Cask Storage Systems for Spent Nuclear Fuel

Single Purpose, Directly-Loaded Storage Cask—Is a cask designed to meet only the NRC storage cask requirements in 10 CFR Part 72. This type of storage cask would be used to store SNF that has been directly loaded into a basket or fuel cells that are contained within a steel shielding overpack, which in turn is sealed by a bolted lid with double metallic seals. The cask would not be authorized for use in shipping the SNF under the transportation requirements in 10 CFR Part 71; therefore, use of this type of storage cask at the proposed PFSF would require the SNF to be loaded into a separate NRC-approved shipping cask for shipment of the SNF to and from the proposed PFSF. This would require a fuel transfer facility at the proposed PFSF in order to transfer the SNF to and from the storage cask and shipping cask. Conceptually, the fuel transfer facility would be designed to transfer bare SNF (i.e., individual unshielded fuel assemblies) to and from the storage cask and shipping cask by means of either a dry transfer system (e.g., hot cell) or a wet transfer system (e.g., fuel pool). The fuel transfer facility would likely need to maintain a negative pressure to ensure radioactive material would not escape the facility, and all air exiting the building would be routed through high efficiency particular air (HEPA) filters to capture any airborne radioactive particles. A wet pool transfer system would also require active filtration systems to minimize water contamination. In addition, use of this type of storage cask would likely require an active seal monitoring system and would possibly require a seal maintenance facility to inspect, repair, and replace the cask seals, if necessary.

Single Purpose, Canister-Based Storage Cask—Is a cask designed to meet only the NRC storage cask requirements in 10 CFR Part 72. This type of storage cask would be used to store SNF that is inside a sealed (welded) steel canister. During storage, the canister would be placed in a metal or concrete overpack which provides radiation shielding. The canister would be passively cooled by natural convection heat transfer through air vents on a concrete overpack or by direct conduction through a metal overpack. The canister would not be authorized for use in shipping inside any overpack under the transportation requirements in 10 CFR Part 71; therefore, use of this type of storage cask at the proposed PFSF would conceptually require a fuel transfer facility—similar to that described above—in order to transfer the SNF to and from the storage cask and shipping cask. The fuel transfer facility would also likely require additional equipment needed for closing (welding) and opening (cutting) the canister at the proposed PFSF.

Dual Purpose, Directly-Loaded Cask System—Is a cask system designed to meet both the NRC storage cask requirements in 10 CFR Part 72 and the NRC transportation requirements in 10 CFR Part 71. This type of storage cask system would be used to store SNF that has been loaded into a basket or fuel cells that are contained within a steel shielding overpack, which in turn is sealed by a bolted lid with double metallic seals. The same overpack could be used for both storage and shipment. This cask system would not require a fuel transfer facility and, therefore, could be shipped to and from the proposed PFSF without directly handling the SNF. In addition, use of this cask system would likely require an active seal monitoring system and would possibly require a seal maintenance facility to inspect, repair, and replace the cask seals, if necessary.

Dual Purpose, Canister-Based Cask System—Is a cask system designed to meet both the NRC storage cask requirements in 10 CFR Part 72 and the transportation requirements in 10 CFR Part 71. This type of storage cask system would be used to store SNF that is inside a sealed (welded) steel canister. During storage, the canister would be placed in a metal or concrete overpack which provides radiation shielding. This cask system would not require a fuel transfer facility and, therefore, could be shipped to and from the proposed PFSF without directly handling the SNF. However, the canister would be placed into a different NRC-approved metal overpack for shipment to and from the proposed PFSF. Therefore, this cask system would require a canister transfer facility at the proposed PFSF. This is the type of cask system (including the canister transfer building) that would be used at the proposed PFSF. See Section 2.1.2 of this FEIS for a further, more detailed description.

(Continued on next page)

Dry Cask Storage Systems (continued)

Modular Vault Dry Store System—Is a large concrete storage vault designed to store several storage containers of SNF under the NRC storage requirements of 10 CFR Part 72. Conceptually, SNF would be placed in tube-like metal containers which serve as the primary confinement boundary. Each container could store approximately four PWR assemblies and be sealed by a bolted lid with double O-rings. The containers are placed in the concrete vault and are cooled by passive natural convection through large vents in the storage vault. The vault could be designed to store several modules of SNF storage containers. Each module could hold up to 36 storage containers. The containers would be placed into a NRC-approved metal overpack for shipment to and from the proposed PFSF. This cask system would not require a fuel transfer facility and, therefore, could be shipped to and from the proposed PFSF without the need to directly handle the SNF. Because of the low capacity of individual containers, additional shipments to and from the proposed PFSF would likely be required, as compared to use of traditional storage casks. At the proposed PFSF the containers would be removed from the transportation cask and inserted into the vault. Inspection and replacement of O-rings might also possibly be necessary.

result in a loss of efficiency and increased costs. A wet ISFSI also would involve additional handling of the fuel, which would likely lead to higher radiation exposure for workers, as well as an increase in the risk of a fuel-handling accident. For these reasons, alternatives that employ wet storage technologies have not been evaluated further in this FEIS.

2.2.3 Alternative Sites

PFS undertook a site selection process in 1996 to identify viable locations for the proposed ISFSI. The site selection process and criteria used by PFS are described in Chapter 7 and in Appendix F. Through its site selection process, PFS identified the Reservation as its preferred site. Once the preferred site was identified, a preferred location was selected (i.e., Site A) for the PFSF. In addition, PFS identified an alternative location on the Reservation (i.e., Site B). PFS also identified a site in Fremont County, Wyoming, as an alternative, secondary site (see Section 2.2.3.3); however, PFS has elected to pursue the leasing and development of the Skull Valley site. The license application that is the subject of this FEIS specifically applies only to the Skull Valley site; however, this FEIS compares the proposed site to two alternative sites to determine if such an alternative site is an obviously superior alternative to the proposed PFSF site. The Wyoming location is evaluated in Chapter 7 of this FEIS as an alternative to the site proposed in PFS's license application.

2.2.3.1 Site A at the Reservation

The PFS site-selection process resulted in the identification of a primary and an alternative ISFSI site for consideration on the Reservation. The Skull Valley Band determined the candidate site area on the Reservation. The only offered land on the Reservation encompassed sections in the northwest corner of the Reservation (see Figure 2.1 and the discussion in Section 2.1.1 of this FEIS). Two potential locations, Site A and Site B, were identified by PFS on the Reservation within the area proposed (i.e., within Sections 6 and 7 of T5S/R8W) by the Skull Valley Band. These potential sites were evaluated and a final site (i.e., Site A) was selected. Only minor differences existed between the two sites. The proposed site (Site A) was selected over the alternative site because of its greater distance to the nearest resident's home [3.2 km (2.0 miles) to the east-southeast].

2.2.3.2 Site B at the Reservation

As shown in Figure 2.11, Site B in Skull Valley is located about 800 m (0.5 mile) south of the proposed site (Site A), 1.6 km (1 mile) north of the Hickman Knolls outcropping, and 4.5 km (2.8 miles) north of the inactive Tekoi Rocket Motor Test facility. Approximately one-half of Site B is in Section 6 of T5S/R8W, with the other half in Section 7 of T5S/R8W. The resident's home nearest to Site B is approximately 3.1 km (1.9 miles) to the east. While only minor differences exist between site A and B, both sites were evaluated in detail to present a full discussion of the potential impacts associated with each site on the Reservation for the BIA decision maker. Selection of Site B in any Record of Decision would require the Skull Valley Band and PFS to amend the proposed lease (which currently applies only to Site A.)

2.2.3.3 Fremont County, Wyoming, Site

The alternative site in Wyoming (see Figure 2.12) is located north of Shoshoni, Wyoming, about 39 km (24 miles) northeast of Riverton and about 16 km (10 miles) southeast of the Owl Creek Mountains. It is also about 9 km (6 miles) east of the Wind River Indian Reservation. The site is described and analyzed in greater detail in Chapter 7.

2.2.4 Transportation Options

2.2.4.1 National Transportation Options

The PFSF is designed to employ dual-purpose canister-based storage systems. Because of the size and weight of the licensed shipping casks, shipment by rail is the only practicable cross-country transportation option for the SNF to be delivered to Skull Valley. While movement of SNF casks of this size is sometimes accomplished by specialized, heavy-haul truck and trailers, this is usually done only over short distances. Heavy-haul trucks and trailers typically travel at speeds of 10–20 mph, thus making them impractical for transporting SNF cross-county. Accordingly, truck transportation is not considered a viable option for cross-country transportation to the proposed PFSF and is not analyzed in detail. Smaller shipping casks have been certified for SNF transport, but they would require additional transfer operations at the PFSF, and would have greater environmental impacts than cross-country rail transportation using a dual-purpose canister system. If PFS decides to use a dual-purpose canister based cask system different from that included in its license request, including a design that can be transported by truck, PFS would be required to amend its license. The license amendment would require a new NEPA review that would evaluate the impacts of cross-country truck transportation and associated transfer operations.

2.2.4.2 Local Transportation Options (in Skull Valley)

In this FEIS, the phrase "local transportation options" refers to the alternatives for moving SNF from the existing Union Pacific main rail line to the proposed PFSF on the Reservation. PFS has submitted two applications to the BLM: one as their proposed action and the other as an alternative proposal. The proposed action, as described in Section 2.1.1.3, involves the construction of a new rail line from Skunk Ridge. PFS's alternative proposal is construction of a new ITF near Timpie, Utah, and the use of heavy-haul tractor/trailers from the ITF to the PFSF via the existing Skull Valley Road. Since the BLM would approve only one of these right-of-way applications, or would deny them both, these two local transportation options are considered separately in this FEIS.

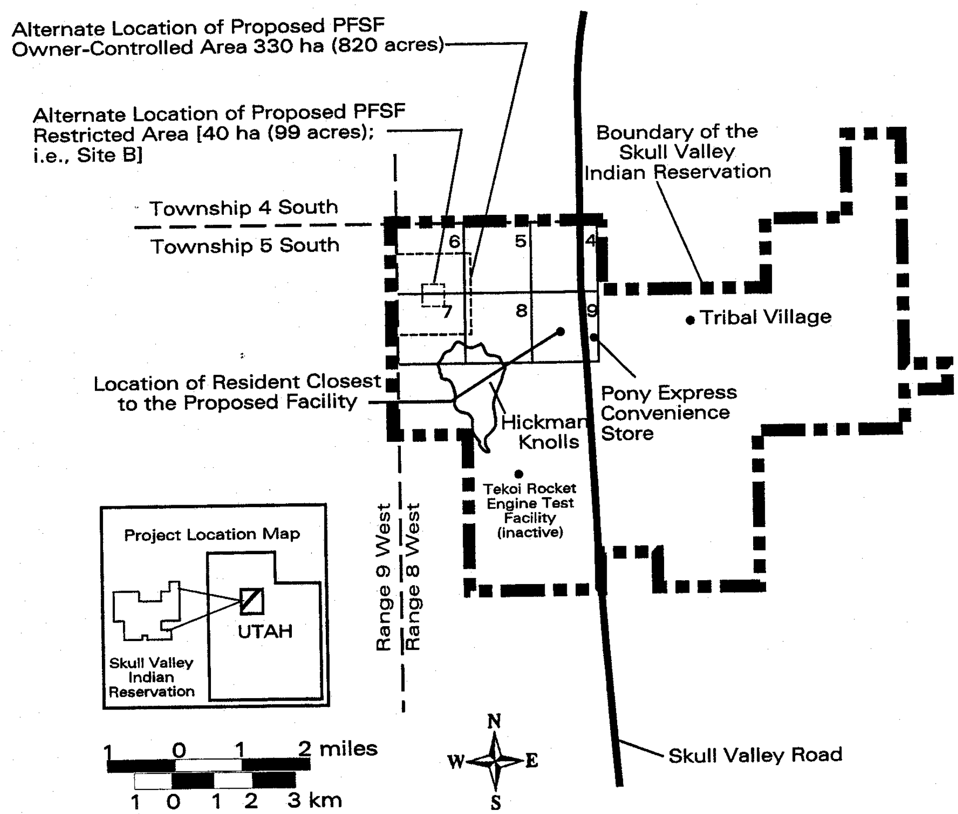

Figure 2.11. Alternative site (i.e., Site B) for the proposed PFSF on the Reservation.

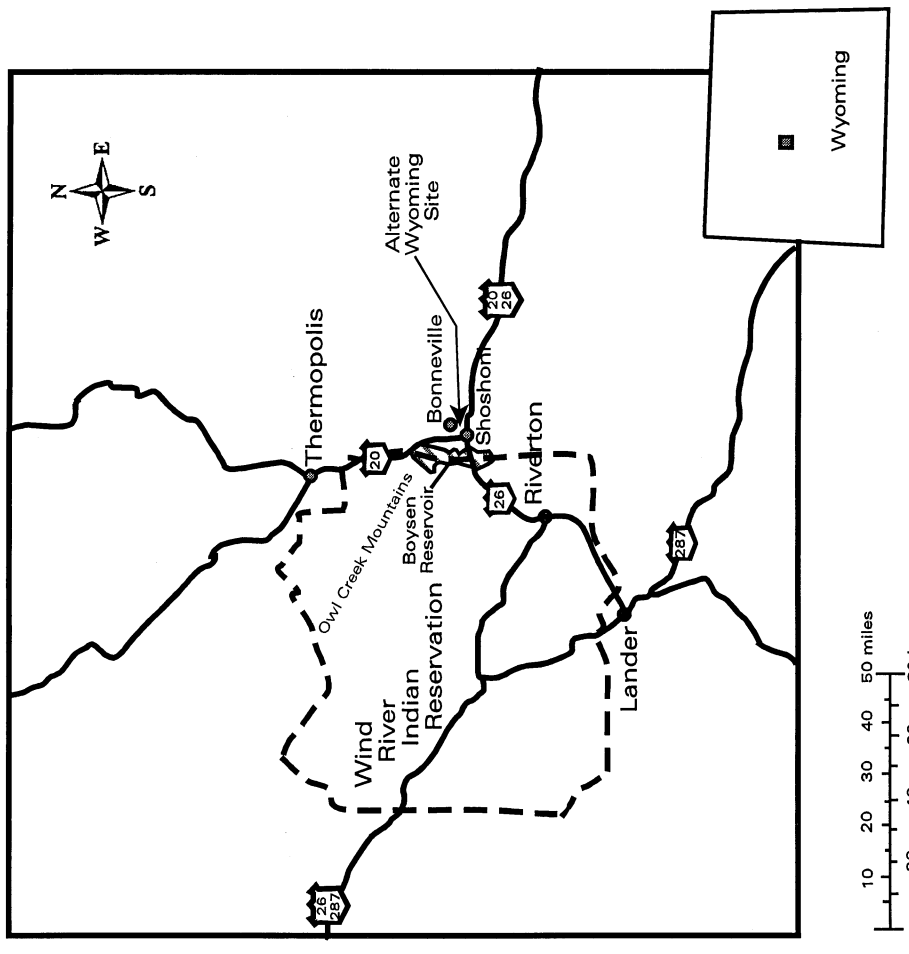

Figure 2.12. Location of an alternative ISFSI site in Fremont County, Wyoming.

Several other local transportation options were considered but eliminated from detailed analysis. Below is a summary of the ITF alternative evaluated in detail in this FEIS, as well as the other transportation alternatives considered but eliminated from further evaluation.

The ITF alternative. An alternative to the proposed new rail corridor through Skull Valley would be the use of an ITF, where SNF shipping casks would be transferred from railcars to heavy-haul vehicles for transport to the proposed PFSF. PFS has filed a right-of-way application with the BLM to construct and operate an ITF near Timpie, Utah. The ITF would be located approximately 2.9 km (1.8 miles) west of the intersection of Interstate 80 and the Skull Valley Road (see Figure 2.13), and approximately 39 km (24 miles) north of the site for the proposed PFSF. The existing Skull Valley Road would be used to transport the SNF shipping casks from the ITF to the PFSF. The descriptions below are taken from PFS's Plan of Development for the proposed ITF (Hennessy 1999).

The right-of-way parcel lies between the existing Union Pacific rail line to the north and an existing frontage road to the south (see Figure 2.14). Construction of the ITF would be scheduled to begin upon issuance of the required approvals for the proposed PFSF and would be expected to last less than one year. The peak workforce would be 35 workers during the construction period.

The right-of-way parcel for the ITF would be approximately 300 m (1,000 ft) long and 100 m (350 ft) wide. The parcel would be connected to the existing frontage road by way of a new 9-m (30-ft) wide asphalt-paved road within a corridor of approximately 80 m by 30 m (270 ft by 100 ft). A new rail siding would also be constructed as part of the ITF. The total area of the ITF parcel is about 3.6 ha (9 acres). The total project area would be about 4.4 ha (11 acres), including 0.8 ha (2 acres) of land for the proposed new rail siding which would be located entirely on the existing Union Pacific right-of-way (see Figure 2.14).

Clearing of the ITF project area would involve the removal and disposal of vegetation within the right-of-way. Any woody vegetation would be shredded and scattered in place. Topsoil at the site would not be stockpiled, and the right-of-way would not be revegetated. All 4.4 ha (11 acres) have been previously disturbed, and they would remain disturbed for the life of the project if the ITF were constructed.

The ITF would be designed to transfer cargo from railcars onto heavy-haul tractor/trailers. As shown in Figure 2.14, the proposed ITF would include one pre-engineered metal building (i.e., the Transfer Building) to house a single-failure-proof, 150-ton gantry crane for transferring cargo from rail to truck, a short rail siding, and a road that would loop around the perimeter of the facility to provide maneuvering space for the heavy-haul tractor/trailer rigs. The loop road would connect to the proposed ITF access road, which in turn would connect to the existing frontage road. In addition to thenew access road, gravel or paved areas would be needed to park and maneuver the heavy-haul tractor/trailer rigs and to provide parking for worker's vehicles.

The ITF Transfer Building would be about 24 m (80 ft) wide, 60 m (200 ft) long, and 16.5 m (54 ft) high. Excavation would be required at the site for installation of the foundation supporting the crane and the building's framework. The facility would be immediately surrounded by a 2.4-m (8-ft) chain link fence to control public access, and it would be illuminated at night by sodium vapor yard lights. A range fence would enclose a buffer area around the entire facility (see Figure 2.14).

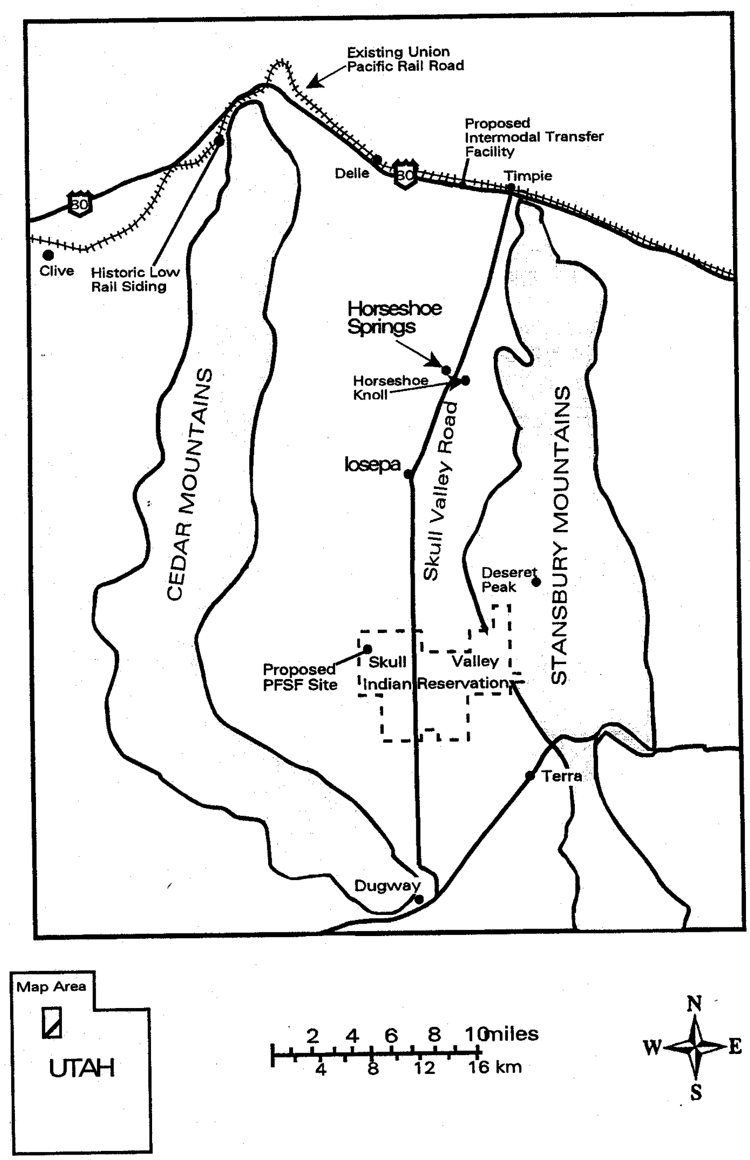

Figure 2.13. Proposed location of an Intermodal Transfer Facility in Skull Valley.

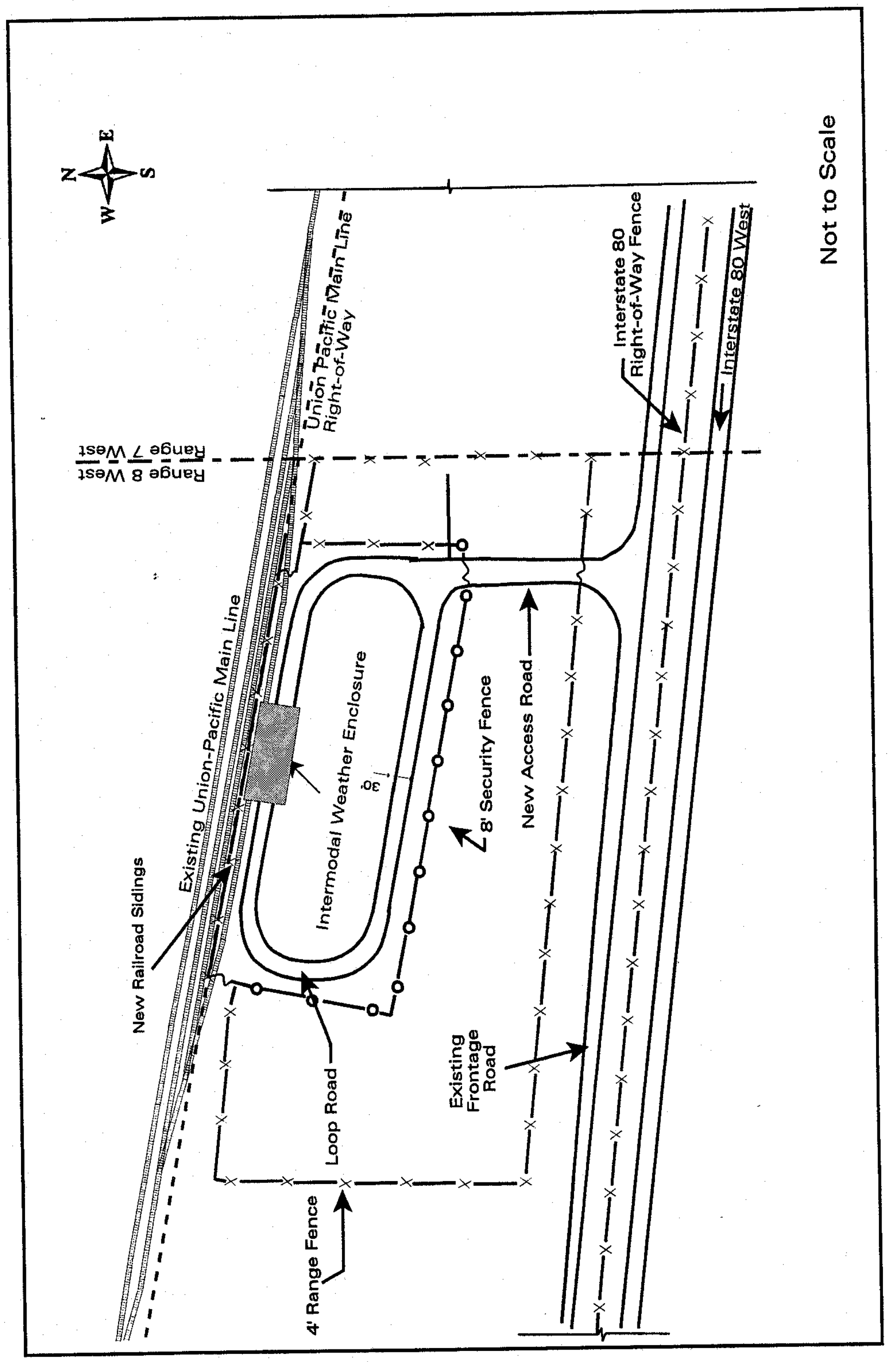

Figure 2.14. Basic site plan and layout for the Intermodal Transfer Facility.

Potable water would be provided for the ITF in an on-site water storage tank and water distribution system. The tank would be refilled periodically by a local commercial drinking water supplier. Sewage facilities would be provided by an on-site septic system and drain field.

The new rail siding for the proposed ITF would consist of three sections of sidetrack connected to the main line with switches and turnouts. The rail siding would be about 780 m (2,550 ft) long and would be located entirely upon the adjacent Union Pacific right-of-way. Approximately 4,100 m^3 (5,400 yd^3) of sub-ballast and 3,300 m^3 (4,300 yd^3) of ballast would be required. Table 2.8 provides a list of the materials that would be needed to construct the ITF.

Table 2.8. Materials to be imported and used in the construction of an intermodal transfer facility (ITF) near Timpie, Utah

Material type		Material Required
Concrete aggregate		
	Small (sand)	880 m^3 (1,150 yd^3)
	Large (crushed rock)	1,200 m^3 (1,600 yd^3)
	Total concrete aggregate	2,100 m^3 (2,750 yd^3)
Crushed rock		
	Access road base	500 m^3 (650 yd^3)
	Oval track base	2,300 m^3 (3,000 yd^3)
	Total crushed rock	2,800 m^3 (3,650 yd^3)
Structural fill materials		2,000 m^3 (2,700 yd^3)
Sub-ballast		4,170 m^3 (5,450 yd^3)
Ballast		3,300 m^3 (4,300 yd^3)
Asphalt paving		1,900 m^3 (2,500 yd^3)

Source: PFS/ER 2001; Table 4.1-6

Construction of the ITF would require a total daily water use of about 80 m^3/day (21,200 gal/day), which would be primarily associated with dust control and soil compaction. This water would be provided by local commercial suppliers and would be transported to the site in tanker trucks.

If an ITF were constructed, then only three casks per train could be accommodated on shipments of SNF to Skull Valley from existing nuclear reactors. To achieve the maximum receipt rate of 200 casks per year, the ITF would be operated to receive two equivalent incoming trains per week carrying two casks per train (i.e., an average of four casks per week). A four-man crew would be expected to handle the transfer operations at the ITF.

The type of heavy-haul trailers proposed for use on Skull Valley Road range from 45 to 55 m (150 to 180 ft) in length and are typically 3.7 m (12 ft) wide (see Figure 2.15). These vehicles use dozens of tires to distribute the weight within typical highway load limits; nevertheless, the use of such trailers on Skull Valley Road would require a permit from the state of Utah due to their overall weight and length. No upgrades or improvements to the existing Skull Valley Road have been proposed by PFS for the transportation alternative involving a new ITF and the use of heavy-haul vehicles.

A minimum of two heavy-haul tractor/trailers would be used to move the SNF shipping casks from the ITF to the proposed PFSF. The heavy-haul tractor/trailer would move at no more than 30 km/h (20 mph) along Skull Valley Road. To transport the maximum of 200 shipping casks per year, two to four tractor trailer round-trips would be scheduled each week. The heavy-haul vehicles would be refueled from a self-contained diesel fuel filling tank located near the Operations and Maintenance Building at the proposed PFSF. This tank would be similar to the tank described in Section 2.1.1.2 for the cask transporter vehicles, except that its capacity would be 4.5 m^3 (1,200 gal). Once at the proposed PFSF, the shipping casks would be unloaded and handled the same as if they had been transported to the PFSF by the proposed Skunk Ridge rail corridor (see Section 2.1.2.1).

PFS has stated that the decommissioning and closure of the ITF would involve the dismantling and removal of the following structures: the rail siding, the pre-engineered metal building and its foundation, and the access road. The disturbed areas would be covered with topsoil and replanted with vegetation.

Local transportation options and alternatives considered but eliminated from detailed evaluation. Other local transportation schemes were considered but eliminated from detailed evaluation. These alternatives are discussed below.

Construction of a new rail line from a location other than Skunk Ridge. Building a new rail line from any location other than Skunk Ridge would involve the construction of a new siding to the north of Interstate 80, creating an unresolved problem in how to cross the interstate to reach the Reservation to the south. Construction of a new rail line on the eastern side of Skull Valley parallel to the Skull Valley Road was eliminated from analysis due to the likelihood for any such construction activity to directly impact wetlands at Horseshoe Springs (see Figure 1.3), existing houses and ranches, or traffic on Skull Valley Road. Thus, this alternative is not evaluated in this FEIS.

Another location considered was a rail line option that would use an existing rail line east of the Stansbury Mountains with a new corridor around the north end of these mountains (i.e., between the mountains and Interstate 80) and continuing south along Skull Valley Road. This option would result in construction impacts to the wetlands, houses, ranches, and traffic along Skull Valley Road, as well as substantial excavation at the north end of the Stansbury Mountains. Thus, this alternative is not evaluated in this FEIS.

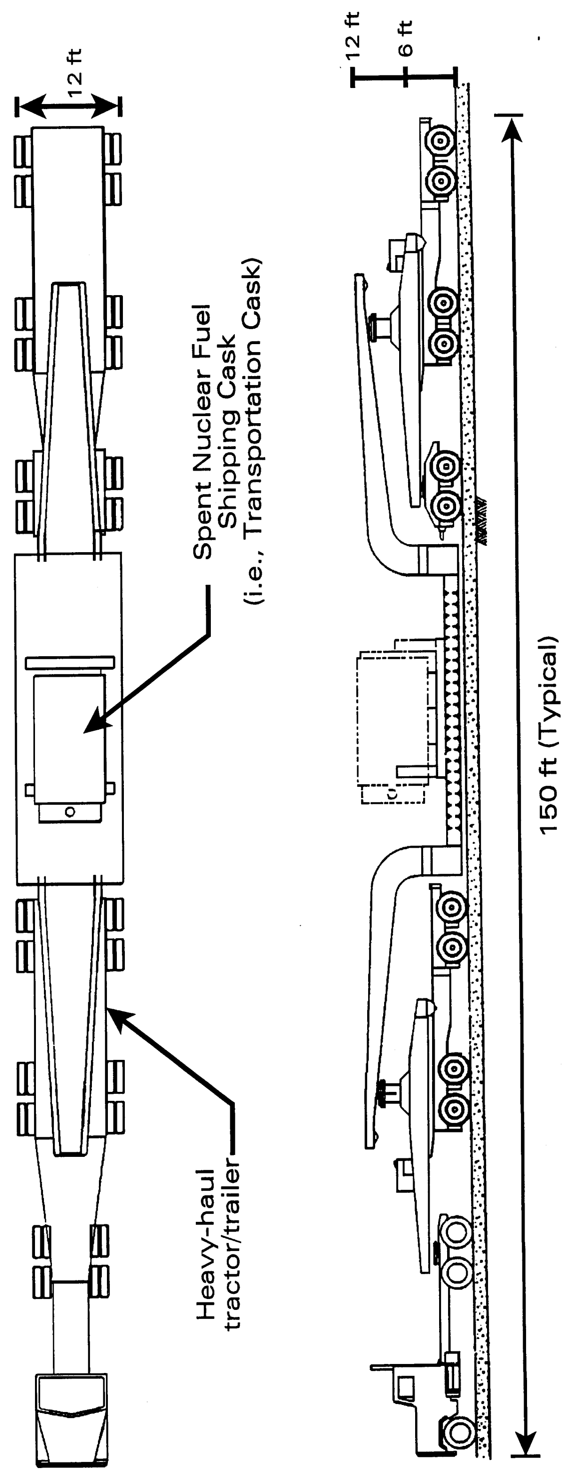

Figure 2.15. Typical heavy-haul tractor/trailer rig used for transporting spent nuclear fuel shipping casks.

Construction of an alternative route/alignment from Skunk Ridge. PFS has identified an alternate alignment to the proposed route for the new rail line (see Section 2.1.1.3 and Figure 1.2) that would connect the new rail siding at Skunk Ridge with the Reservation. The alternative route (called the west valley rail alternative) would lie about 600 to 900 m (2,000 to 3,000 ft) east of the proposed route over a length of about 10.5 km (6.5 miles) (see Figure 2.16). Other routes farther to the east of the alternative route would fall on State land, which PFS has stated would be in conflict with the selection and design criteria for their proposed rail route.

The alignment of the proposed rail route generally follows the 1335-m (4380-ft) contour line (i.e., elevation above mean sea level) along the eastern foot of the Cedar Mountains. This elevation is approximately the same as the elevation of Site A on the Reservation (see Section 2.1.1.1). The grade (or slope) of either rail alignment would be limited to 1.5 percent, based on PFS's determination of the best fit of locomotive tractive effort and horsepower, as well as locomotive braking and safety considerations. PFS has stated that the proposed route, with a maximum grade of 1.5 percent, would create a balance between the amounts of material removed to the level of the rail bed (i.e., "cut" areas) and the amounts required in "fill" areas. The west valley rail alternative, however, would follow undulating terrain and, over most of its length, would be constructed on land with an elevation approximately 30 to 45 m (100 to 150 ft) lower than the proposed alignment. The west valley rail alternative would have to be built almost entirely on fill material. In addition, the rail bed of the alternative route would have to be built to elevations up to 6 m (20 ft) above existing grade levels, because of the constraint imposed by the 1.5 percent grade limitation. This raised rail bed would have a visual impact and could interfere with the access to existing roads and grazing allotments, the movement of wildlife, and the fighting of wildfires in the Cedar Mountains and in the western portion of Skull Valley. PFS has estimated that the west valley rail alternative would require the emplacement of approximately 428,000 m^3 (560,000 yd^3) of fill material and raised rail bed, of which about 200,000 m^3 (260,000 yd^3) would have to be imported to the construction site from other locations. The proposed alignment avoids the above types of impacts by more closely following existing contours and grade levels and by minimizing the height of the rail bed at grade crossings for vehicles.

As explained below, impacts to wilderness values from the proposed rail line would not significantly differ from impacts expected from the west valley alternative route, because the North Cedar Mountains contain no wilderness or wilderness study designation and contain no wilderness values or characteristics. In 1980, BLM considered the northern portion of the Cedar Mountains for designation as wilderness during its Utah land inventory process. The area was found to lack naturalness (i.e., it did not fit the attributes of being affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable); outstanding opportunities for solitude or a primitive and unconfined type recreation; and supplemental values (i.e., ecological, geological, or other features of scientific, educational, scenic, or historical value). Based on the wilderness characteristic analysis, BLM recommended the North Cedar Mountains area <u>not</u> be designated a wilderness study area (see 45 *Fed. Reg.* 75602-75604).

Pursuant to BLM's *Wilderness Inventory and Study Procedures* (in BLM Manual H-6310-1), the Southern Utah Wilderness Alliance (SUWA) submitted a proposal to BLM on April 11, 2001, suggesting the proposal contained "supplemental and new information" that would compel BLM to revisit the 1980 North Cedar Mountains determination. Although the SUWA proposal contained the required elements, as outlined in BLM Manual H-6310-1, the proposal did not describe or present information which differed significantly from information in prior BLM inventories regarding the wilderness values of the area. The proponent (i.e., SUWA) did not provide any significant new information that would change the 1980 intensive inventory determination, or support a re-evaluation of the area.

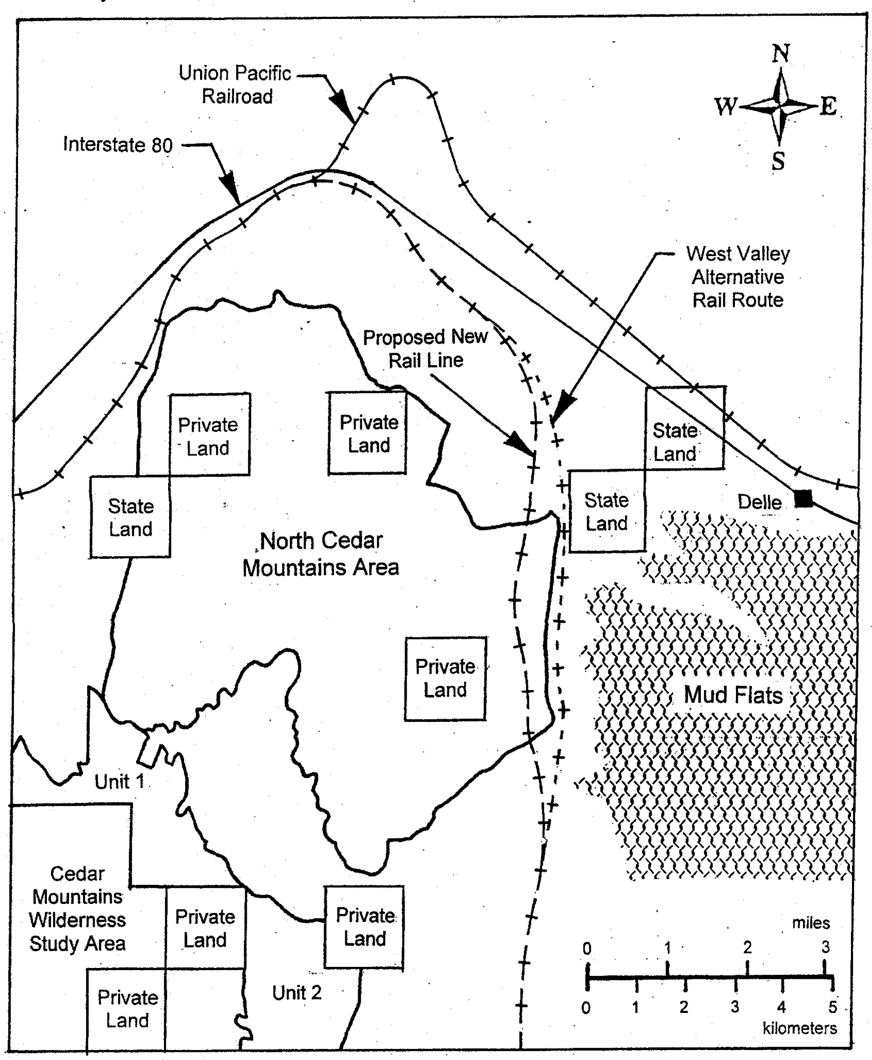

Figure 2.16. Alternative rail route/alignment near the northern end of the Cedar Mountains.

On May 7, 2001, a determination was made by BLM's Salt Lake Field Office Manager that the material provided by SUWA did not constitute significantly different information to warrant further review of the North Cedar Mountains wilderness values (at that time). This determination is not an appealable decision. To date, SUWA has not submitted additional proposals to BLM on the North Cedar Mountains area.

Based on the above evaluation, the NRC staff and the Cooperating Agencies conclude that the west valley rail alternative would result in greater environmental impacts, compared to the proposed rail route, due to increased excavation and cut and fill activities. In addition, the Cooperating Agencies have determined that the west valley rail alternative would not result in any significant reduction in impacts to recreation or wilderness characteristics of the adjacent land, when compared to the proposed route. Therefore, a more detailed evaluation of this alternative is not required.

Construction of an ITF and access road from Skunk Ridge or Delle, Utah. A new ITF, similar to the one described above, could be constructed at a location other than near Timpie. One possible location would be between Delle and Skunk Ridge. Construction of an ITF at such location would result in increased disturbance of historic transportation features, including U.S. 40.

Construction of an ITF and an associated road at Skunk Ridge would have similar construction impacts to those for the proposed rail line, and would include the additional excavation for the ITF itself. The new access road would follow the proposed rail line corridor. An ITF at Skunk Ridge would be located closer to Interstate 80, creating a greater visual intrusion than for a new rail siding at Skunk Ridge (as proposed by PFS).

Delle was also considered as a potential location for an ITF. An existing siding at Delle could be expanded to meet PFS's needs, with space available for location of the ITF facilities. There is an existing Interstate-80 underpass at Delle that could allow access to the south. The proposed road route from Delle (see Figure 2.17) would connect with the proposed rail line corridor and would follow the proposed rail corridor to the PFSF. This alternative would eliminate the extensive excavation required at Skunk Ridge, but would require crossing short sections of the mud flats located south of Delle and Interstate 80. This alternative ITF and access route would occupy areas that are currently utilized by recreationists and motorists southwest of Interstate 80.

Construction of a new ITF and an associated road from either Delle or Skunk Ridge would result in additional construction and maintenance impacts not associated with an ITF near Timpie, as well as operational impacts (such as additional radiological exposure from SNF handling) that would be avoided or reduced using transport on a new rail line through Skull Valley. Therefore, these alternatives were not evaluated in further detail in this FEIS.

2.2.5 No-Action Alternative

The no-action alternative would be not to build the proposed PFSF. Under the no-action alternative, there would be no lease with the Skull Valley Band, and the Skull Valley Band would be free to pursue alternative uses for the land in the northwest corner of the Reservation.

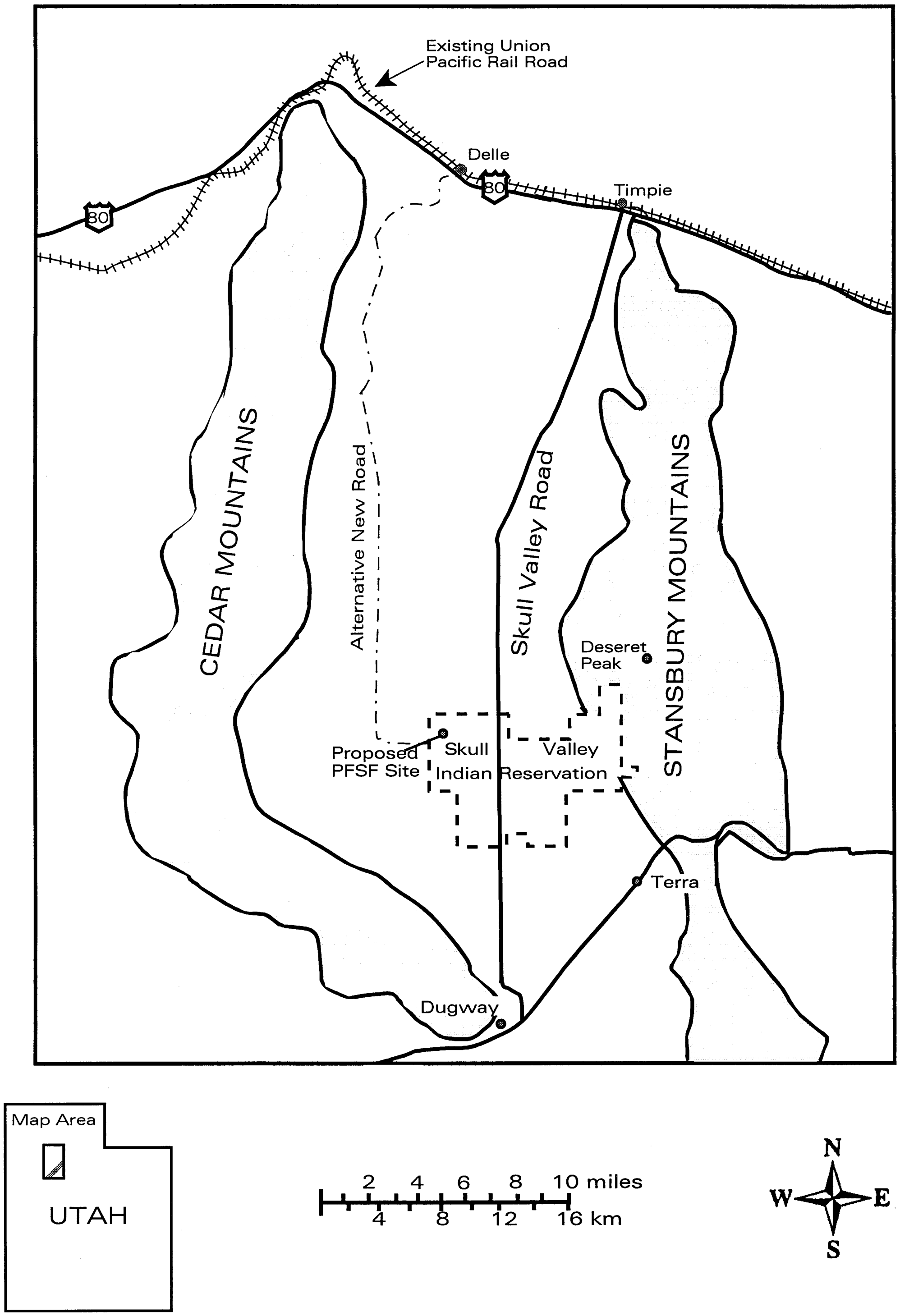

Figure 2.17. Alternative route for a new road in the western portion of Skull Valley.

Under the no-action alternative, no right-of-way approvals would be granted by the BLM and no amendments would be required for existing BLM Land Use Plans. The public lands administered by the BLM at the proposed ITF location near Timpie, as well as at the proposed Skunk Ridge rail siding location and along the proposed Skunk Ridge rail corridor would be available for other uses compatible with existing land use plans. Under the no-action alternative, STB would not approve construction of the proposed rail line.

Under the no-action alternative, NRC would not approve the license application to construct and operate the proposed PFSF. Nuclear power reactor licensees would continue to store SNF at their reactor sites in facilities such as SNF pools and/or at-reactor dry cask ISFSIs until the SNF can be shipped to a permanent geological repository.

In the absence of NRC license approval, there are several options that the PFS member or non-member utilities could pursue. At some reactor sites, the reactor licensees could expand the onsite storage capacity for SNF by constructing and operating at-reactor ISFSIs under a site-specific or general license, or, if possible, by expanding the capacity of their SNF pools. Some reactor licensees have already initiated or completed such expansions under their existing licensees and would be unable to expand further. Under this option, all SNF would be stored at existing sites until such time as a permanent geological repository or other storage facility becomes available. For other sites where expansion of onsite storage cannot be accommodated either economically or because of physical constraints, reactor licensees could propose developing a different ISFSI away from the reactor sites, or they would have to shutdown reactors before expiration of their operating licenses. In any event, under the no action alternative, SNF would continue to be stored at sites other than the proposed PFSF in Skull Valley, until such time as a permanent geological repository or another storage facility becomes available.

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3. POTENTIALLY AFFECTED ENVIRONMENT IN SKULL VALLEY, UTAH

This chapter describes the existing natural resources and the environmental characteristics of Skull Valley, Utah. The descriptions provided in this chapter focus on the proposed location for the proposed PFSF on the Reservation, as well as on the location for the proposed new Skunk Ridge rail siding and rail corridor. A description of the location for the alternative ITF near Timpie is also included.

The information and data presented in this chapter provide a baseline description of the environment against which the various alternatives from Chapter 2 are evaluated in Chapters 4 and 5. The information presented in this chapter serves as the reference point against which the changes to the environment, both positive and negative, are assessed.

This chapter presents information on (a) geology, minerals, and soils, (b) water resources, (c) climate and air quality, (d) ecological resources, (e) socioeconomic and community resources, (f) cultural resources, (g) background radiological characteristics, and (h) other environmental features, including ambient noise levels, scenic qualities, and recreation.

3.1 Geology, Minerals, and Soils

This section provides a brief description of regional and local geology and identifies the characteristics of soils and mineral resources in Skull Valley. As described in Section 1.5.1, the NRC's process for reviewing the PFS license application includes an examination in a safety evaluation report of the ability of the facility's design to withstand earthquakes. The discussion of geology in this section of the FEIS is not intended to represent a detailed safety analysis of the facility's ability to resist seismic events. The NRC staff's review of the PFSF's seismic design is documented in the SER, as updated.

3.1.1 Geology

Skull Valley is located within a topographic valley about 35 km (22 miles) east of the Great Salt Lake Desert and about 80 km (50 miles) west of Salt Lake City. As shown in Figure 1.1, the valley is bounded on the east by the Stansbury Mountains, where Deseret Peak rises to a maximum elevation of over 3,300 m (11,000 ft) above sea level [or approximately 1,600 m (5,500 ft) above the valley floor]. The Cedar Mountains are located to the west of the valley and rise to elevations of approximately 2,300 m (7,700 ft) above sea level.

The proposed PFSF location lies within a sediment-filled structural basin in the eastern portion of the Basin and Range Province. This physiographic province is characterized by a roughly north-to-south trending series of fault-bounded, alternating ranges and basins. The eastern boundary of the Basin and Range Province is located at the Wasatch Front, about 90 km (55 miles) east of the proposed PFSF location. The Wasatch Front delineates the boundaries between the Great Basin to the west, the Colorado Plateau in southeastern Utah, and the Middle Rocky Mountains in northeastern Utah.

During the Miocene, Pliocene, and Pleistocene Epochs, normal faults west of the Wasatch Range uplifted and tilted large blocks of the earth's crust into the north-to-south-trending basin and range structures that exist today. The "range" portion of these structures include the Cedar and Stansbury Mountains while the "basins" include Skull Valley. To assist the reader, Table 3.1 identifies the various geologic periods.

The Wasatch Front is part of a distinct north-trending zone of elevated seismic activity which extends from northern Arizona to northwestern Montana. This 100-km (60-mile) wide by 1,300-km (800-mile) long zone has been identified as the Intermountain Seismic Belt (ISB) by Smith and Sbar (1974). The ISB encompasses a region which has experienced more than 15 recorded earthquakes with magnitude greater than 5.5, including one 7.1 magnitude event in 1959 at Hebgen Lake, Montana. The Skull Valley site lies at the western boundary of this region.

In Skull Valley, the top of bedrock occurs at depths ranging from 520 to 880 ft (PFS/SAR 2001) and is composed of Cambrian through Tertiary units (Geomatrix 1999). The Cedar Mountains are underlain by the Pennsylvanian Oquirrh Group (Hintze 1971). The Stansbury Mountains are underlain by the lower Cambrian Prospect Mountain Quartzite. Hickman Knolls, located about 1.6 km (1 mile) south of the proposed site, has been mapped as Fish Haven Dolomite of Ordovician age. Hickman Knolls is recognized as a dolomitic mega-breccia. About 1.6 km (1 mile) northeast of the site, a series of low hills (Castle Rock Knoll) have been mapped as Deseret Limestone of Mississippian age (Moore and Sorenson 1979).

Table 3.1. Geologic time scale

Era	Period	Epoch	Relevant formations	Age (millions of years)
Cenozoic	Quaternary	Holocene		0.1 to present
		Pleistocene	Lake Bonneville	1.6 to 0.1
	Tertiary	Pliocene		5.3 to 1.6
		Miocene	Salt Lake	23.7 to 5.3
		Oligocene		36.6 to 23.7
		Eocene		57.8 to 36.6
		Paleocene		66.4 to 57.8
Mesozoic	Cretaceous			144 to 66.4
	Jurassic			208 to 144
	Triassic			245 to 208
Paleozoic	Permian			286 to 245
	Carboniferous	Pennsylvanian		320 to 286
		Oquirrh Group		360 to 320
		Mississippian Deseret		
	Devonian			408 to 360
	Silurian			438 to 408
	Ordovician		Fish Haven	505 to 438
	Cambrian		Prospect Mountain	570 to 505

The valley is filled with more than 150 m (500 ft) of interbedded alluvial (stream) and lacustrine (lake) sediments that developed from alluvial fans from the bordering mountains or from ancient Lake Bonneville lacustrine deposition, respectively. Generally, alluvial deposits are coarser-grained near the margins of the adjacent mountains and become finer-grained as they extend toward the valley axis.

Valley fill sediments consist of Tertiary-aged siltstones, claystones, and tuffaceous sediments of the Salt Lake Formation unconformably overlain by Quaternary-aged lacustrine deposits. Particularly within the last 700,000 years, sedimentation in the valley was associated with fluctuations in the Bonneville Basin. Sediments from the most recent such fluctuations (from about 12,000 to 28,000 years ago) were associated with different lake stages of ancestral Lake Bonneville. The presence of two prominent paleosols (ancient soils) that developed between periods of lacustrine sedimentation were used for stratigraphic correlation of the uppermost sediments at the proposed site. A detailed physical and stratigraphic description of the basin fill sediments is presented in Geomatrix (1999).

3.1.2 Seismic Setting

The region has a long recorded history of seismic activity. Prior to the installation of a State-wide network of seismic stations in 1962, most records were based on anecdotal reports. PFS tabulates (PFS/ER 2001) 113 earthquakes that have occurred from 1850 to 1961. The largest measured historic earthquake that has occurred in the area was magnitude 6.6 in the northern end of the Great Salt Lake about 140 km (90 miles) north of the proposed PFSF site. This earthquake produced 50 cm (20 inches) of vertical ground displacement along a zone 12 km (7.5 miles) long (PFS/ER 2001). The closest magnitude 5.0 or greater earthquakes occurred about 67 km (42 miles) northeast of the site.

The Stansbury Fault, East Cedar Mountains Fault, and mid-valley faults (East, West, and Springline Faults; see Figure 3.1) are geologic structures that can contribute to the seismic hazard at the site. In the event of earthquake-induced displacement on one of the mid valley faults, displacement could be transferred to other mid-valley faults. Similarly, displacements originating in one segment of the Stansbury Fault or East Cedar Mountains Fault could be transferred to other segments. Details of both probabilistic and deterministic seismic hazard analyses and the effects of ground surface rupture resulting from an earthquake in Skull Valley are available in PFS's SAR (PFS/SAR 2001).

The NRC's SER, as updated, has evaluated the seismic setting of the proposed PFSF site. The SER concludes that two potentially capable fault sources are located within 11 km (7 miles) of the proposed site. Their closest approaches are estimated to be about 8.8 km (5 miles) for the East Cedar Fountain Fault and 10 km (6 miles) for the Stansbury Fault. The earthquake mean magnitude associated with these two faults would be 6.8 and 7.0, respectively (NRC/SER, as updated). The adequacy of the proposed PFSF to withstand earthquakes is addressed in the NRC's SER and is not addressed further in this FEIS; however, a summary of the findings of the seismic information from the SER is presented in Section 4.7.2.3 of this FEIS.

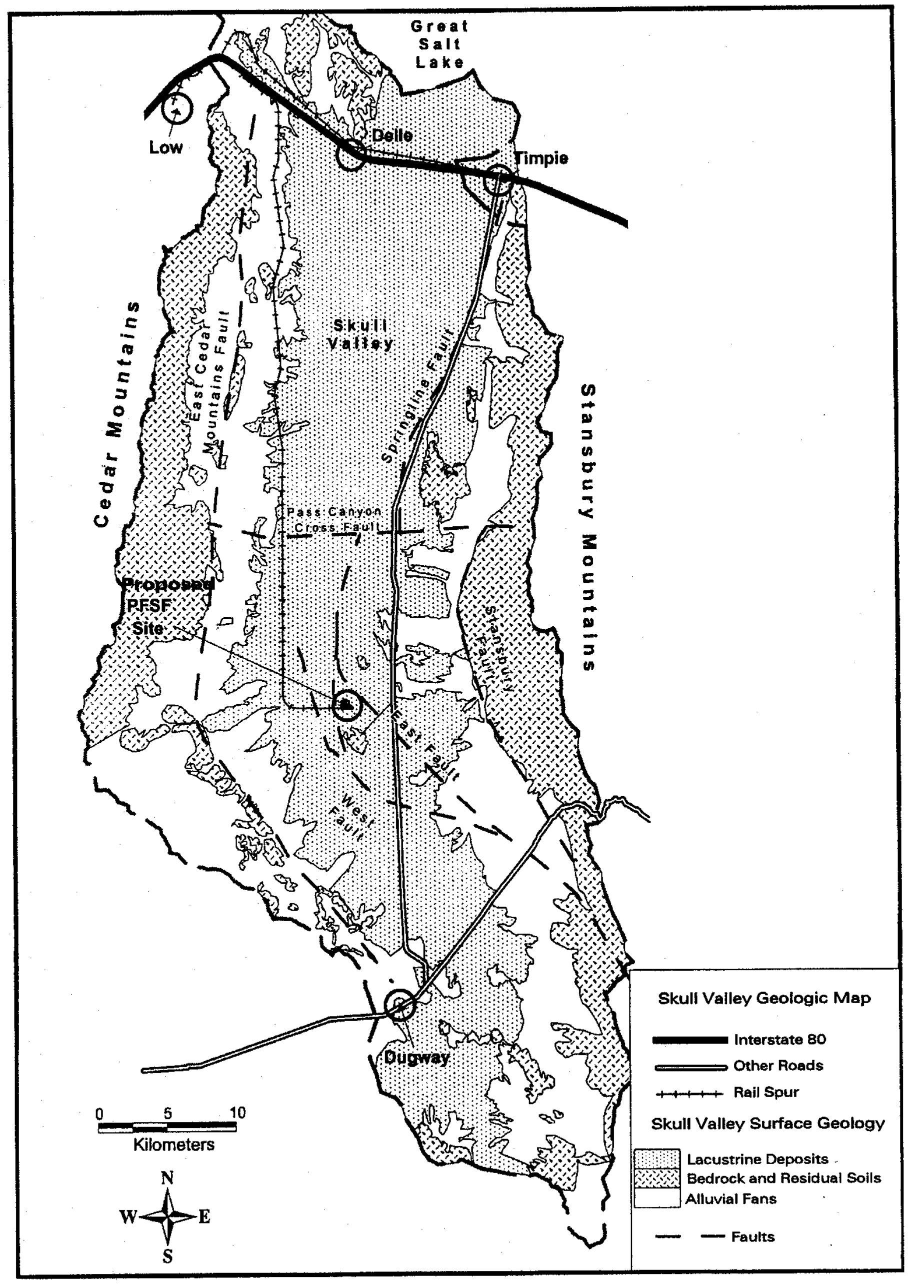


Figure 3.1. Mapped and interpreted surface and subsurface structural features in the immediate area of the proposed site. *Source:* Geomatrix Consultants, Inc. "Fault Evaluation Study and Seismic Hazard Assessment, Private Fuel Storage Facility, Skull Valley, Utah, (Project No. 4790)," Final report No. GMX-4790 (Revision 0), prepared for Stone and Webster Engineering Corporation, Denver, Colo., prepared by Geomatrix Consultants, Inc., San Francisco, Calif., February 1999.

3.1.3 Soils

Site subsurface materials consist of ancestral Lake Bonneville lacustrine (lake) and aeolian (windborne) deposits. Geomatrix (1999) describes thin [nominally 30 cm (1 ft) thick] soils from three test pits in the immediate area of the proposed action. Soils are described as both overlying and underlying aeolian deposits occurring within the upper 1 m (3 ft) of the subsurface. Organic content is reported to be low (no more than 20 percent to 30 percent) to nonexistent. Soils were generally not classified or identified by Geomatrix in the remaining 22 test pits located outside the immediate area of the proposed action.

In a series of test borings aligned east-to-west along the center of the proposed project area, Geomatrix (1999) describes an upper 0.6 to 1.2 m (2 to 4 ft) of silt and soil underlain by silty clay to depths of nominally 2.4 to 2.7 m (8 to 9 ft). Similar borings aligned east-to-west along the northern boundary of the proposed project area are described similarly in the PFS SAR. Water content of the silty clay materials varied from about 9 percent to more than 50 percent. The similarity of the descriptions in the two reports suggests that material occurrences are relatively uniform throughout the proposed action area, although the precise depths of occurrence may vary.

The following description is from information provided by Tooele County, Utah (W. Brodersan, Natural Resources Conservation Service, U.S. Department of Agriculture, Salt Lake City, Utah, personal communication to R. R. Lee, Oak Ridge National Laboratory, Oak Ridge, Tenn., February 17, 2000). The description begins at Skunk Ridge and progresses southward to the proposed PFSF site at the Reservation. Soils at the ITF site near Timpie are mapped the same as those at the proposed PFSF site, and their description is combined with that for the proposed site below. Because there is no abrupt or clearly-defined location at which the soil types change along the proposed rail route, only general descriptions are provided below.

Soils at the northern end of the new rail line are well-drained gravelly to very gravelly sandy loam with good roadfill characteristics. They are poor as sand and gravel resources because of excess fines, and also poor as topsoil because of the abundance of small stones. Permeability is moderately rapid [5 to 15 cm/hr (2 to 6 inches/hr)] with a low shrink-swell potential. Organic content is between 0.5 and 1 percent. Water erodibility is low, while wind erodibility is moderate.

Further south along the proposed rail corridor, these soils change to a fine sandy loam. They are improbable as sand and gravel resources because of excess fines and fair to poor as topsoil because of excess salt and small stones. Permeability is moderately rapid [5 to 15 cm/hr (2 to 6 inches/hr)] with a low shrink-swell potential, and pH varies from 7.9 to 9.0. Organic content is between 0.5 and 1 percent. Water erodibility is moderate, and wind erodibility is high.

Soils along the southern-most portions of the proposed rail line and at the preferred site (Site A), the alternative site (Site B), and the ITF site near Timpie are a silty clay loam. They are improbable as sand and gravel resources because of excess fines, poor for topsoil because of excess salt, and poor for roadfill because of their low strength. Permeability is moderately slow [0.5 to 1.5 cm/hr (0.2 to 0.6 inches/hr)], and the soils have a low to moderate shrink-swell potential. Organic content varies from 0 to 1 percent, and pH varies from 7.9 to 9.0. Erodibility to both water and wind is moderate.

3.1.4 Mineral Resources

The State of Utah and the Basin and Range Province have abundant mineral resources. Bon (1995) reports the presence of eleven large mine permits and plants in Tooele County including gold and silver, building stone, industrial minerals, and salt. Of these, the closest to the proposed PFSF site is a 5-ha (12-acre) surface quarry of aragonite dimension stone located about 10 km (6 miles) south of Low in the Cedar Mountains. Slightly further south and on the western flank of the Cedar Mountains, Tripp et. al. (1989) report the presence of several limestone and dolomite quarries and one iron prospect near Hastings Pass. Tripp et. al. (1989) also report a small prospect of unidentified material located about 3 km (2 miles) southeast of Horseshoe Springs, two small iron claims about 13 km (8 miles) southeast of Horseshoe Springs, and another small iron prospect immediately north of the Reservation at the foot of the Stansbury Mountains. Numerous small claims of unidentified commodities and one small multi-metal claim are also reported by Tripp et. al. (1989) to be near the foot of the Stansbury Mountains southeast of the Reservation and adjacent to a small silica sand deposit located on the eastern edge of the valley about 13 km (8 miles) northeast of Dugway. Tripp et. al. (1989) report a very large sand and gravel resource in the Tooele quadrangle while lacustrine deposits are the chief resources that contain large quantities of high-quality aggregate.

Gloyn (1999) reports the potential for shallow mineral deposits in the immediate vicinity of the proposed site and surrounding area. The most likely mineral types are copper with the potential for surrounding lead-zinc-silver or gold-silver. Minor but numerous lead-zinc-silver, iron, copper-silver, and arsenic-antimony-silver mines and prospects are noted in the adjacent Cedar and Stansbury Mountains. Several similar suspected gold or silver claims are also noted in Skull Valley. Most of the claims in both the valley and adjacent mountains are reported by Gloyn (1999) to have lapsed, suggesting a past but discontinued interest in the area at present.

BLM (1999) reports five existing sand and gravel pits and six oil and natural gas leases in or near the proposed action area. Two active mining claims are identified on the eastern flank of the Cedar Mountains, and the entire length of Skull Valley has been identified as prospectively valuable for oil and gas minerals. Much of the valley north of the proposed site is also prospectively valuable for geothermal resources.

PFS has identified five commercial sources of construction materials between 10 and 77 highway km (6 and 48 highway miles) from the proposed PFSF site (see Figure 3.2). These five sites are described in Table 3.2. All of the sites in Table 3.2 are on private land.

3.2 Water Resources

3.2.1 Surface Water Hydrology and Quality

3.2.1.1 General Site Setting

The proposed PFSF in Skull Valley (see Figure 1.1) would be located approximately 39 km (24 miles) south of the present shoreline of the Great Salt Lake. In the Late Pleistocene Epoch (see Table 3.1), Skull Valley was inundated by Lake Bonneville, the predecessor of the existing Great Salt Lake.

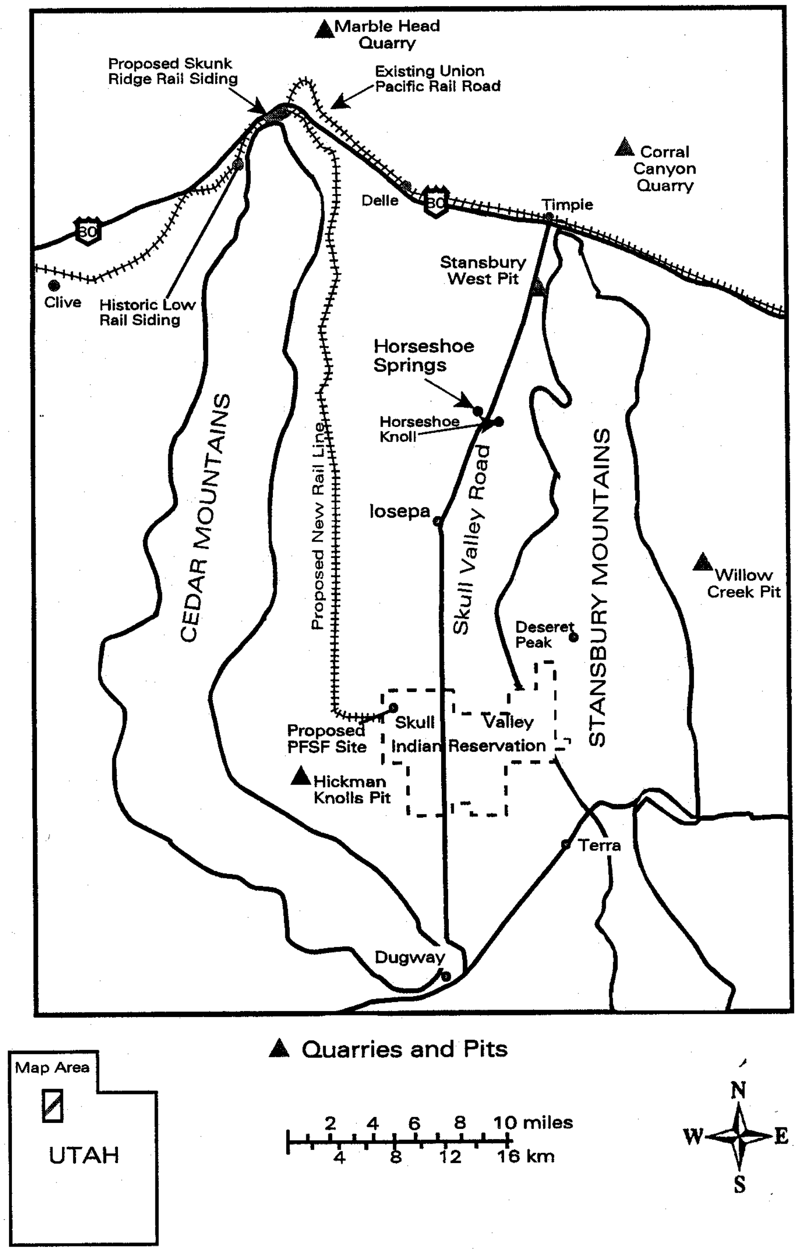


Figure 3.2. Locations of potential sources of construction aggregate in Skull Valley.

Table 3.2. Types of construction materials and their quantities available in the vicinity of Skull Valley

Type of material	Site 1	Site 2	Site 3	Site 4	Site 5	Total
Sand	109,000 m^3 (143,000 yd^3)	82,000 m^3 (107,000 yd^3)	109,000 m^3 (143,000 yd^3)	NA	NA	300,000 m^3 (393,000 yd^3)
Crushed rock (1")	164,000 m^3 (214,000 yd^3)	137,000 m^3 (179,000 yd^3)	164,000 m^3 (214,000 yd^3)	NA	NA	465,000 m^3 (607,000 yd^3)
Small road base ($\leq$1")	109,000 m^3 (143,000 yd^3)	82,000 m^3 (107,000 yd^3)	109,000 m^3 (143,000 yd^3)	NA	NA	300,000 m^3 (393,000 yd^3)
Large road base (approx. 1.5")	109,000 m^3 (143,000 yd^3)	82,000 m^3 (107,000 yd^3)	109,000 m^3 (143,000 yd^3)	NA	NA	300,000 m^3 (393,000 yd^3)
Structural fill material (1½" minus)	109,000 m^3 (143,000 yd^3)	82,000 m^3 (107,000 yd^3)	109,000 m^3 (143,000 yd^3)	NA	NA	300,000 m^3 (393,000 yd^3)
Common fill	109,000 m^3 (143,000 yd^3)	82,000 m^3 (107,000 yd^3)	109,000 m^3 (143,000 yd^3)	NA	NA	300,000 m^3 (393,000 yd^3)
Sub-ballast	109,000 m^3 (143,000 yd^3)	82,000 m^3 (107,000 yd^3)	109,000 m^3 (143,000 yd^3)	NA	NA	300,000 m^3 (393,000 yd^3)
Ballast	NA	NA	NA	219,000 m^3 (286,000 yd^3)	219,000 m^3 (286,000 yd^3)	438,000 m^3 (572,000 yd^3)

Site 1: The Stansbury West Pit, approximately 27 km (17 miles) north of the proposed PFSF site.
Site 2: The Hickman Knolls Pit, approximately 10 km (6 miles) west of the proposed PFSF site.
Site 3: The Willow Creek Pit, approximately 77 km (48 miles) north-east of the proposed PFSF site.
Site 4: The Corral Canyon Quarry, approximately 61 km (38 miles) north-northeast of the proposed PFSF site.
Site 5: The Marble Head Quarry, approximately 56 km (35 miles) north of the proposed PFSF site.

Note: Distances reported to the five sites above are highway/road miles.

Figure 3.3 shows the locations of drainage channels, springs, and surficial geology/soil. Annual precipitation in Skull Valley ranges from 18 to 30 cm (7 to 12 inches) while the adjacent Stansbury mountains receive up to about 100 cm (40 inches) and the Cedar Mountains receive 40 to 51 cm (16 to 20 inches) of precipitation (PFS/ER 2001). Based on data collected between 1997 and 1998, approximately 26 cm (10.2 inches) of precipitation fell annually at the site. Much of the precipitation falls as snow. Snowmelt provides flow in streams, most of which are intermittent, that drain the mountains.

Local drainage features are poorly developed dry washes [<0.3 to 0.66 m (<1 to 2 ft deep)] that may carry flows temporarily during spring snowmelt or during infrequent summer thunderstorms. Because of the arid climate and geologic conditions in and around the mountains, most of the runoff from the mountains either evaporates or infiltrates into alluvial materials near the margins of Skull Valley. Infiltration of runoff from the mountains recharges aquifers in the alluvial fans that extend beneath Skull Valley. There are few perennial streams in Skull Valley and none near the site of the proposed PFSF.

The total watershed area of Skull Valley is approximately 1,800 km^2 (446,000 acres). Surface water runoff generally drains from south to north into the Great Salt Lake. The proposed site is located on the northern toeslope of Hickman Knolls, a rocky outcrop near the center of the valley. Hickman Knolls and the slightly elevated land surface around the base of the knolls form an area of high ground in the valley. The proposed PFSF site is located on this slightly elevated portion of the Skull Valley floor. The local topography is comprised of a series of north-trending shallow washes that carry surface runoff from the site and upslope areas to the south near the knolls.

The proposed site location is on an upland area that forms a drainage area boundary between the main axis of Skull Valley and a southwestern drainage area that drains a portion of the Cedar Mountains (see Figure 3.3). The drainage basins, as described below, were determined during the flood analysis conducted as part of the NRC staff's safety review (see NRC/SER). The site is centrally located in the watershed, with 48 percent of surface drainage area upstream and 52 percent downstream. About 700 km^2 (173,000 acres) of drainage basin lie to the south (upstream) of the proposed PFSF site in the main upstream watershed area, approximately 165 km^2 (41,000 acres) lie upslope to the southwest toward the Cedar Mountains, and approximately 948 km^2 (234,000 acres) lie downstream of the site toward the Great Salt Lake.

There are no perennial lakes or ponds within 8.5 km (5 miles) of the proposed PFSF site or along the proposed Skunk Ridge rail corridor other than a few stock ponds or small reservoirs used to store irrigation water (PFS/ER 2001). There are no public or private surface water sources used for human consumption in Skull Valley.

The stream nearest to the proposed PFSF site is Indian Hickman Creek, (see Fig. 1.2), which flows westward from the Stansbury Mountains onto the Reservation. This creek is over 6.5 km (4 miles) from the proposed PFSF site. It feeds the Reservation's water supply reservoir. Indian Hickman Creek originates from springs in the mountains and has recorded flowrates at the Reservation boundary of 70 to 90 L/s (2.5 to 3.1 ft^3/s) from April 6 to June 5.

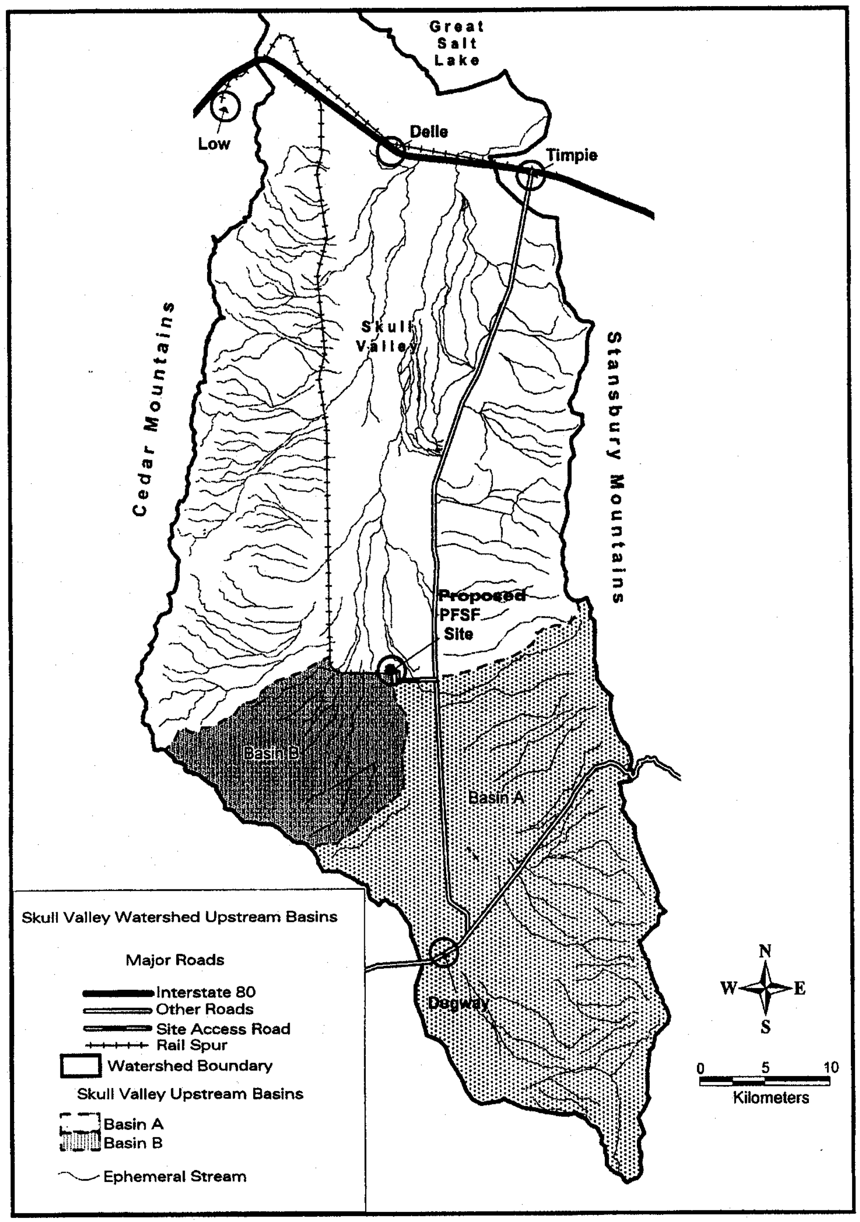


Figure 3.3. Drainage channels and soils/surficial geology in Skull Valley.

The stream channel feature nearest to the proposed site is approximately 500 m (1,500 ft) to the northeast, is up to 1 m (3 ft) deep, and is 2 to 2.5 m (6 to 8 ft) wide in places (PFS/ER 2001). No flow was observed in this channel during the observation period of June 1996 through February 1997 (PFS/ER 2001). The nearest perennial surface water flow downstream of the proposed PFSF site is Horseshoe Springs located 16 km (10 miles) to the north (PFS/ER 2001).

3.2.1.2 Flooding

The potential for site flooding is summarized in this EIS. The details of the flooding analysis performed for the PFSF site can be found in NRC staff's SER.

Flooding is an extremely rare event in the Skull Valley area. The proposed site lies on an elevated drainage basin boundary on the northern toeslope of Hickman Knolls. The direct upslope drainage area that would generate overland flow onto the site between Hickman Knolls and the site is approximately 260 ha (640 acres). Access routes to the proposed site, including the access road from Skull Valley Road to the Skunk Ridge rail corridor, cross other areas with larger upslope drainage areas. After heavy rainfall or snowmelt, surface runoff in the normally dry washes in the vicinity of the proposed site and access routes could exceed the channel capacities and flooding could occur. During 1982 and 1983, much of the State of Utah experienced unusually high annual precipitation [i.e., 38 cm (15 inches) and 33 cm (13 inches), respectively, compared to an annual average of 20 cm (7.7 inches)]. Adverse effects on the stability of Skull Valley Road were noted. According to Kaliser (1989), Skull Valley Road was softened sufficiently that two heavy transport carriers were adversely affected. One vehicle sank into the asphalt, presumably because of softening of road fill under the pavement, and the other overturned. It is not apparent that substantial improvements have been made to Skull Valley Road to prevent similar occurrences.

As described in the previous section, the upstream area that could contribute runoff to potential floods is subdivided into two basin areas–Basin A, and Basin B (NRC/SER). Basin A includes approximately 700 km^2 (173,000 acres) of southernmost Skull Valley. Basin B includes approximately 165 km^2 (41,000 acres) of runoff area to the south of the PSF site. The Basin A dry stream channel approximately 500 m (1,500 ft) northeast of the site would carry floodflows from an upstream basin area of approximately 700 km^2 (173,000 acres). The minor drainage channels that exist on the site would be supplied by sheet flow from the area south of the site to Hickman Knolls during extreme rain events.

The normal elevation of the Great Salt Lake is about 1281 m (4203 ft). In 1986, the Great Salt Lake flooded to a recent high level of 1283.8 m (4211.85 ft) above sea level. Planning documents issued by the State of Utah Department of Natural Resources in January 1999 have designated the floodplain elevation of the Lake as 1284 m (4212 ft) for planning purposes and 1285 m (4217 ft) as the extent of the Lake's historic floodplain.

Components of the proposed PFSF project for which flood impact has been reviewed include the facility, the site access road from Skull Valley Road, and the rail line access route. Flooding impacts are discussed in Sections 4.2 and 5.2.

3.2.2 Groundwater Hydrology and Quality

Groundwater flows generally northward in Skull Valley toward the Great Salt Lake. Groundwater in the region is generally recharged in the mountains and alluvial aprons on their flanks adjacent to the valleys. Springs occur in a number of settings in Skull Valley. Some springs shown on area maps occur in bedrock areas in the mountains, some occur in alluvial aprons or near the axis of Skull Valley, while others occur on or near the outcrop of faults. The Springline Fault (as shown in Figure 3.1) is a major geologic feature in the eastern portion of Skull Valley. Several prominent springs in Skull Valley—including Big Spring, Burnt Spring, Muskrat Spring, and Horseshoe Spring—occur along the outcrop of the Springline Fault. (See Section 3.4.2.2 and Figure 3.8 for additional information about these springs.)

Skull Valley is a typical Basin and Range valley that contains a thick accumulation of sediment derived from erosion of the adjacent mountain ranges. The best source of groundwater in Skull Valley in terms of both quantity and quality is the alluvial aquifer along the eastern edge of the valley that receives recharge from streams that drain the Stansbury Mountains. Toward the center of Skull Valley, the Salt Lake Group of Tertiary age (see Table 3.1) comprises the majority of the valley fill and ranges in thickness from 600 m to more than 1,800 m (about 2,000 to 6,000 ft) (PFS/ER 2001).

The Salt Lake Formation is estimated to be approximately 150 to 245 m (500 to 800 ft) thick at the site (PFS/ER 2001). Subsurface investigations performed on the site encountered approximately 6 to 9 m (20 to 30 ft) of fine-grained deposits of clayey silts and silty clays the overlie fine sand that contains interbeds or zones of silty to clayey materials with small amounts of sand. Data are not available to fully define the soil hydraulic properties under saturated or unsaturated conditions however some basic soil moisture content and re-worked soil moisture properties data (Atterberg limits) are available. Soil test data for numerous soil samples obtained within the upper 10 m (33 ft) show that most of the soils are fairly dry with natural moisture contents near the lower end of the plastic range for the silty clays and clayey silts (PFS/SAR 2001; Appendix 2A). This condition is indicative that in addition to the direct percolation of water through the soil column the site soils have the capacity to absorb some infiltrating moisture prior to reaching a state of saturation.

Of the numerous borings performed on site for geotechnical purposes, two borings were advanced to depths greater than about 30 m (100 ft) on site. One of these borings was advanced to a total depth of 47 m (154 ft) and encountered groundwater at a depth of 38 m (124.5 ft). The elevation of groundwater encountered in this boring (4350 ft) is slightly higher than the level estimated for this part of Skull Valley by Hood and Waddell (1968). The other deep boring was advanced to a total depth of 69 m (226.5 ft) and soils below the 38 m (125 ft) depth were noted as damp or wet with only one notation of saturated soils at the 47 m (155 ft) depth. No groundwater table was documented on the boring log.

Seismic reflection surveys were performed on the site as part of geotechnical characterization studies and three profiles provide information on the elevation of the top of the saturated zone (groundwater table) beneath the site (PFS/SAR 2001; Appendix 2B). These data are considered less reliable than direct water level observations made in onsite borings or wells because the interface resolution may not be precise in areas with a variable capillary fringe above the water table or where subsurface material properties result in seismic energy returns similar to those of saturated soils. The saturated zone surface information derived from the geophysical interpretation is useful as a basis of comparison with the limited available well data. Two profiles were performed in a cross pattern centered on the storage pad area and the third was performed near the access road and administration building area. In north-south profile the top of saturated materials interpreted in the seismic reflection profiles is an undulating surface that is generally higher 1332 m (4370 feet) near the southern end of the pad area and lower 1322 m (4335 ft) near the northern end of the pad area. The southernmost end of the profile suggests the potential for a local groundwater seepage gradient to the south toward Hickman Knolls. In east-west profile it appears that the top of the saturated interval is highest (4377 ft) near the eastern edge of the pad area, with a broad low region 1328 m (4355 ft) beneath the center of the site and a slightly elevated saturated surface level 1329 m (4360 ft) near the western edge of the pad area. This overall saturated zone surface configuration would indicate that most of the groundwater movement beneath the site would be toward the center of the site and then northward. The third profile is located southeast (upslope) of the pad area and the inferred top of saturated materials may occur from approximately 1366 m (4480 ft) near the administration area to approximately 1328 m (4355 ft) to the east along the site access road.

In Skull Valley groundwater is supplied from unconsolidated or semi-consolidated sediments that formed from alluvial fan deposits. Recharge to the area groundwater system is mainly from infiltration and snow melt runoff on the Stansbury Mountains. The alluvial aquifer along the eastern edge of the valley is recharged by stream infiltration and direct recharge through the coarse-grained soils of the coalesced alluvial fans. Surficial soils in the alluvial fans have relatively high infiltration capacities [5 to 15 cm/hr (2.0 to 6.0 inch/hr)] as described in Section 3.1. The reported infiltration capacity of soils in Skull Valley is 0.5 to 1.5 cm/hr (0.2 to 0.6 inch/hr) which is equivalent to a saturated hydraulic conductivity of 1.4×10^{-4} to 4.2×10^{-4} cm/sec. One published reference (Hood and Waddell, 1968) states that in Skull Valley little or none of the precipitation that falls on lands below 1616 m (5,300 ft) reaches the groundwater reservoir because the average annual amount of precipitation (the natural source of recharge) is small and because the surficial or near-surface deposits are silt and clay that have low permeability and inhibit downward percolation of water. Localized induced recharge could occur beneath ponds or continually saturated areas if sufficient excess water is available or through natural or man-made permeable pathways beneath water ponding areas. Seasonal perched groundwater and semi-confined ground water can be found in valley fill sand and gravel deposits that are overlain by lacustrine silt and clay deposits although none were noted in boring logs for the PFS project.

The regional water table hydraulic gradient beneath the floor of Skull Valley is about 9.5×10^{-4} to the north toward the Great Salt Lake (PFS/ER 2001). The local hydraulic gradient beneath the site estimated from the top of the saturated zone described above, may be as much as 2.5×10^{-2} to the north. The hydraulic conductivity of the water-bearing zone (determined from a test performed in one onsite well) is approximately 5.0×10^{-5} cm/sec (2.0×10^{-5} inch/sec) (PFS/ER 2001). Based on the estimates for hydraulic parameters at the PFS site the apparent groundwater seepage velocity beneath the site would be approximately 1.2×10^{-6} cm/sec (1.04 m/day). If a saturated zone porosity of 0.3 is assumed, the actual seepage velocity would be approximately 3.9×10^{-6} cm/sec (3.5 m/day). No site-specific hydraulic conductivity test data are available for materials above the water table. Based on available reported surface material infiltration rates and the onsite hydraulic conductivity test result, the hydraulic conductivity profile at the PFS may consist of higher permeability materials overlying lower conductivity material—a condition in which excess water at the land surface could infiltrate to the underlying water table.

Hood and Waddell (1968) have estimated that annual groundwater recharge and discharge are on the order of 3.7×10^7 to 6.2×10^7 m^3 (30,000 to 50,000 acre-ft) with evapotranspiration accounting for 80 to 90 percent of discharge. They also estimate that approximately 9.9×10^5 m^3/yr (800 acre-ft/yr) underflow out of the valley, presumably to the north. Approximately 6.2×10^6 m^3/yr (5,000 acre-ft/yr) of groundwater is withdrawn for domestic and agricultural uses.

Groundwater in the alluvial apron along the base of the Stansbury Mountains contains the lowest total dissolved solids (TDS) in the valley, with concentrations from 100 to 800 mg/L. Groundwater can be obtained from the Salt Lake Formation in some areas near the center of Skull Valley although the TDS content increases toward the center and northern end of the basin. TDS levels between 1,000 and

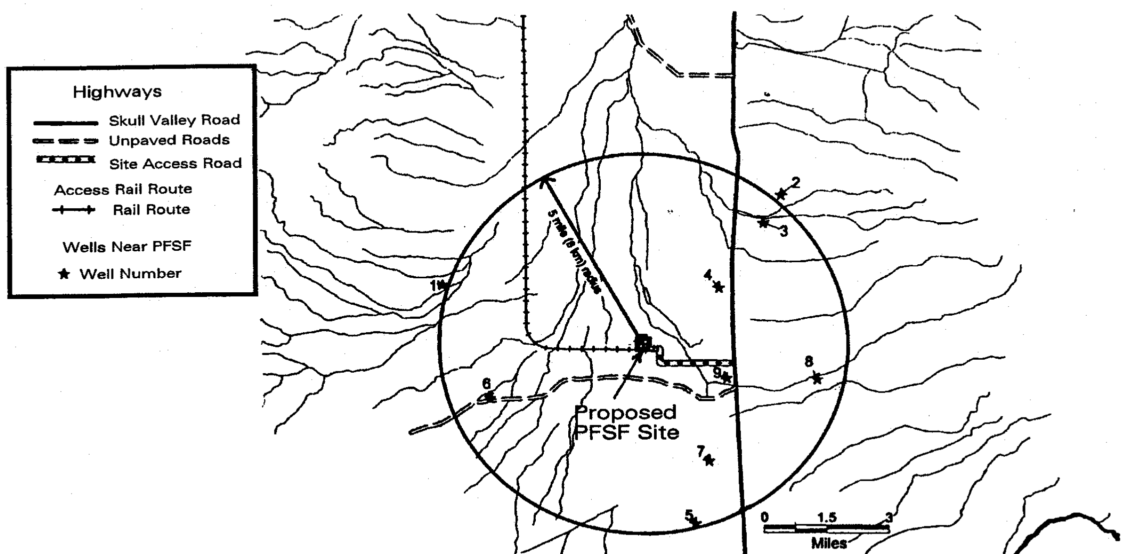
10,000 mg/L have been reported in the central and northern part of Skull Valley (PFS/ER 2001). Sodium and chloride are the principal ions that contribute to elevated TDS in the basin.

3.2.3 Water Use

Water rights in Utah have been described as follows: “All waters in Utah are public property. A water right is a right to the use of water based upon (1) quantity, (2) source, (3) priority date, (4) nature of use, (5) point of diversion, and (6) physically putting water to beneficial use. The Utah pioneers in the late 1840s were the first Anglo-Saxons to practice irrigation on an extensive scale in the United States. Being a desert, Utah contained much more cultivable land than could be watered from the incoming mountain streams. The principle was established that those who first made beneficial use of water should be entitled to continued use in preference to those who came later. This fundamental principle was later sanctioned and is known as the Doctrine of Prior Appropriation. This means those with earliest priority dates who have continuously used the water since that time have the right to water from a certain source before others with later priority dates” (Excerpted from http://nrwrt1.nr.state.ut.us/wrinfo/default/htm, as accessed on 12/4/00). The Reservation was established by Executive Orders of September 7, 1917 (17,920 acres), and February 15, 1918 (640 acres). At the time the Reservation was established, the doctrine of Federal reserved water rights operated to reserve from then–unappropriated sources of water appurtenant to the Reservation an amount necessary to fulfill the purpose of the Reservation. The water rights reserved with establishment of the Reservation assures for the Skull Valley Band the amount of water needed to irrigate practicably irrigable acreage, maintain fisheries, and supply domestic, municipal, and industrial needs.

Sources of potable water for the Reservation and scattered ranches are wells drilled into unconsolidated or semi-consolidated sediments that form the alluvial fan along the toe of the Stansbury Mountains to the east of the proposed PFSF site. Indian Hickman Creek originates in the east of the Skull Valley Reservation on the Wasatch National Forest and flows in a westerly direction onto the Reservation. A pipeline carries water from Indian Hickman Creek to a small reservoir located near the Skull Valley Village. The reservoir stores less than 5 acre-feet of water and approximately 3 acres of land is irrigated with water diverted from Indian Hickman Creek on the Reservation. No surface water in Skull Valley provides private or public drinking water.

Water use in the valley is estimated at 6.2×10^6 m^3/yr (5,000 acre-ft/yr) (PFS/ER 2001). Seven wells are known to extract groundwater for domestic or stock watering purposes within an 8 km (5 mile) radius of the center of the PFSF site. Three of those 7 wells are owned by members of the Skull Valley Band and are not reflected in available records from the State of Utah. Assuming all wells are used to the limit of the applicable water rights, the estimated groundwater withdrawals within the 8 km (5 mile) radius of the site are approximately 1.9 × 106 m^3/yr (1600 acre-feet/yr). Figure 3.4 shows the locations of these wells and indicates ownership and water rights. The well nearest to the site is located approximately 3.2 km (2 miles) away.



Well Map No.	Owner	Total Depth (feet)	Date Drilled	Use	Depth to Water Before Pumping (feet)	Yield When Well Drilling Was Completed (gal per min)	Priority/Allowed Diversion
1	Skull Valley Co., Ltd.	340	1967	Stockwatering	297	No Data	0.015 cfs 1955
2	Island Ranching Co., Inc.	325	1959	Irrigation, Stockwatering	No Data	765	2.18 cfs 1959
3	Island Ranching Co., Inc.	347	1954	Irrigation, Stockwatering	168	No Data	1.226 cfs 1954
4	Auschutz Land Company	408	No Data	Irrigation, Stockwatering	No Data	No Data	0.7487 cfs 1960
5	Auschutz Land Company	209	1948	Stockwatering	150	20	0.015 cfs 1948
6	Auschutz Land Company	292	1940	Stockwatering	280	12	0.015 cfs 1940
7	Skull Valley Indian Reservation	401	1975	Domestic, Industrial	77.5	15	Not Required
8	Skull Valley Indian Reservation	651	1976	Domestic	519.5	60	Not Required
9	Skull Valley Indian Reservation	No Data	No Data	Domestic	No Data	No Data	Not Required

Figure 3.4. Locations of water wells within 8 km (5 miles) of the proposed PFSF.
Note: 1 ft = 0.3048 m, 1 gpm = 3.78541 L/min, 1 cfs = 28.3169 L/sec.

PFS has made inquiry of persons familiar with water quantities and usage in the Skull Valley area and has reported that three permitted wells within a 24 km (15 mile) radius of Low, Utah, are capable of producing 1,510 m^3/day (400,000 gal/day) each. Current withdrawal of water from those wells is less than half the permitted quantity (PFS/RAI3 2000).

Groundwater uses in Skull Valley include domestic use, livestock watering, and irrigation. Wells are normally completed to depths of at least 33.5 m (110 ft) below ground surface in the unconsolidated alluvial deposits on the east side of the valley where water quality is best. The community well for the Skull Valley Band (well no. 8 in Figure 3.4) is about 6 km (4 miles) from the proposed PFSF site.

3.3 Climate and Air Quality

3.3.1 Climate

The broad regional characteristics of the climate of Skull Valley can be described using data from the Salt Lake City International Airport (SLCIA), which has longer records of more meteorological variables than does any other station within 160 km (100 miles). Records for most variables extend back before 1950. However, SLCIA is 80 km (50 miles) northeast of the site of the proposed PFSF, and SLCIA is more strongly influenced by the Great Salt Lake, which is about 5 km (3 miles) to its northwest.

Records at Dugway, about 19 km (12 miles) south of the proposed PFSF site, extend back to 1950 but do not include all the variables recorded at SLCIA. The monitoring station nearest to the proposed PFSF site is located near the Pony Express Convenience Store, about 3.5 km (2.2 miles) southeast of the site, at the closest topographically similar location having access to an AC power source; these data are usually called the “on-site data” in environmental documents relevant to the proposed PFSF. Only two years (1997 and 1998) of such on-site data are available, making the record highly subject to climatic variability of either year. Based on comparisons of the data sets with each other, and with other nearby data from Tooele Army Depot, both sets of data are believed to be generally accurate representations of on-site conditions, and both are used in this FEIS so as to maximize the amount of useful data included in the analysis.

The climate of Skull Valley reflects its mid-latitude continental-interior location; summers are hot and winters are moderately cold. Temperatures at SLCIA rise above 32°C (90°F) on more than half (58 percent) of the days in summer (June through August), and minimum temperatures reach below freezing on about 80 percent of the days in winter (December through February); however, extreme temperatures of −18°C (0°F) or lower only occur on an average of 3 days per winter. The mean January temperature at SLCIA is −2.2°C (28°F); the mean July temperature is 25°C (77°F). Meteorological records for Dugway give the mean January temperature as −2.8°C (27°F), and the mean July temperature as 25.5°C (78°F) (Western Regional Climate Center 1999). The two-year record of on-site data indicates an average January temperature of −0.5°C (31°F) and an average July temperature of 23°C (74°F).

Distance and mountain barriers between Skull Valley and a large source of moisture (i.e., the Gulf of Mexico or the Pacific Ocean) produce a dry climate. Annual average precipitation at Dugway since 1950 has been approximately 20 cm (8 inches), about one-third of which [6.6 cm (2.6 inches)] occurs during the spring months (March, April, and May), with the other two-thirds evenly distributed among the remaining three seasons. The two-year on-site record indicates approximately 26 cm (10.2 inches) of precipitation fall annually. Although the presence of the Great Salt Lake leads to increased precipitation just to the south and southeast of the lake, especially during the winter and spring months when winds are from the north and northwest, the lake's effect on climate at the site of the proposed PFSF is very small.

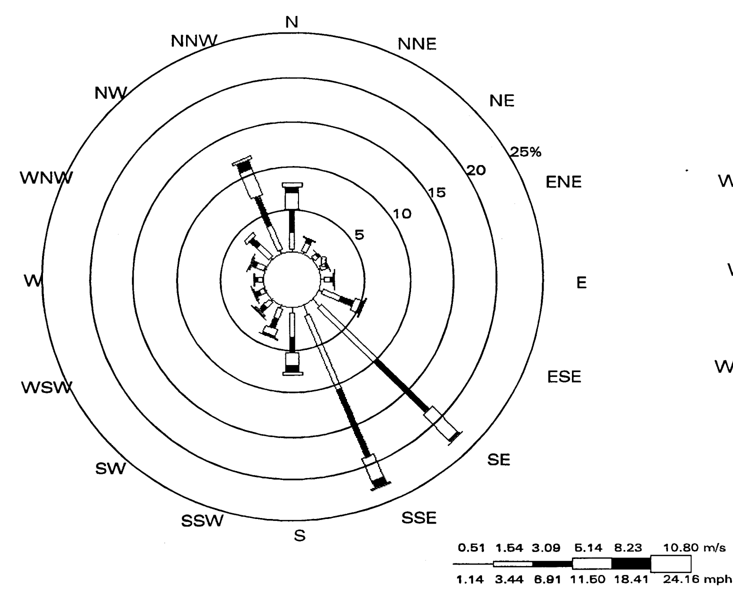
Because dry air allows more heat to escape upward at night, the difference between daily maximum and minimum temperatures is larger than in relatively moist locations. In summer the area receives over 80 percent of the possible amount of sunshine (Wood 1996), and clouds are scarce; this effect further increases the daily temperature range. The July minimum and maximum temperatures average 16°C (61°F) and 34°C (94°F) respectively (Western Regional Climate Center 1999). January mean daily minimum and maximum temperatures at Dugway average −8.3°C (17°F) and 3.3°C (38°F) respectively.

Seasonal variations in relative humidity are large; during the winter, the influence of the Great Salt Lake can provide enough moisture to raise the relative humidity to an average of about 70 percent during daylight hours and about 80 percent during the night at SLCIA, located just to the south-southeast of the Great Salt Lake, where fog occurs on an average of four days per month during winter (Wood 1996). Because Skull Valley is further from the Great Salt Lake and not in a direction of prevailing winds passing over the lake, fog occurrences in Skull Valley would be expected less frequently than at the airport; however, there are no fog data from Skull Valley available for comparison. During summer, when relative humidities at Salt Lake City average around 25 percent during the day and 50 percent at night, fog rarely occurs.

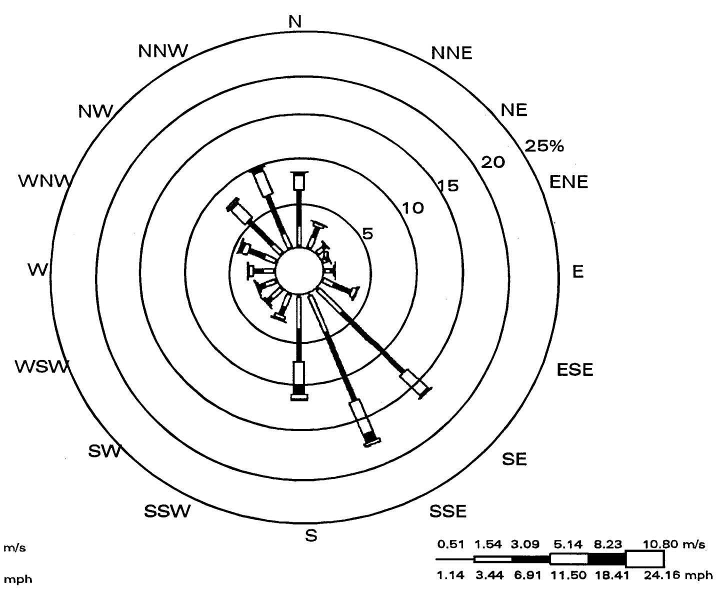
The height above ground to which appreciable vertical atmospheric mixing occurs (the mixing height) is an important factor influencing atmospheric dispersion of pollutants. If mixing height and wind speed are both very low, atmospheric dispersion of pollutants is limited and concentrations of pollutants in a plume originating at any particular source will tend to remain high. Average morning mixing heights over Salt Lake City range from 219 m (719 ft) in the summer to 419 m (1,375 ft) in the spring; these values are lower than for most areas in the United States. Average afternoon mixing heights range from 945 m (3,100 ft) in winter to 3,737 m (12,260 ft) in summer; these values are higher than for most areas in the United States (Holzworth 1972). Because surface temperature is related to mixing height in many meteorological situations, the wide diurnal range of temperature in the region is associated with a correspondingly wide diurnal range of mixing heights.

Winds in the region tend to be aligned with the mountain ranges. Data from the SLCIA indicate that prevailing winds in the area are from the south-southeast or north-northwest; recent (1997–1998) wind data from the Pony Express convenience store, about 3.5 km (2.2 miles) from the site of the proposed PFSF, are in general agreement with the SLCIA data (Figure 3.5). Average annual wind speed is 8.8 mph at the airport and 8.7 mph at the on-site monitoring station.

Extreme wind speeds are often given in terms of a "fastest mile," which is the average speed of the air measured over the time interval it would take the air to travel 1 mile at that speed. For example, a fastest mile of 60 mph implies that an average wind speed of 60 mph was measured over a 60-sec



Pony Express Convenience Store



Salt Lake City, 1984 - 1991

Figure 3.5. Wind roses for Salt Lake City and for the location near the Pony Express convenience store in Skull Valley. The Skull Valley wind rose is based on meteorological data from December 19, 1996, through December 29, 1998.The percentage of the time the wind is from each direction is plotted as a series of bar segments extending from the center of the diagram toward the direction from which the winds come. Wind-speed classes are represented by width and shading of the bar segments; the length of any segment indicates the percentage of all measurements for which the wind is from the indicated direction and also in the indicated wind- speed class. Units of wind speed are given in meters per second (m/s) and miles per hour (mph).

period, and a fastest mile of 90 mph implies that an average wind speed of 90 mph was measured over a 40-sec period.

Fastest mile is a traditional measure of sustained wind speed for use in calculating wind loads for design of buildings and other structures; statistical estimates of the highest values expected during periods of 50 and 100 years at Salt Lake City are given by Mehta et al. (1991) as 70 and 75 mph. Those values are consistent with the highest value of 71 mph at SLCIA, over a 56-year period, given in the Safety Analysis Report (SAR) for the proposed facility (PFS/SAR 2001).

Another measure of extreme wind speed is the peak gust (the highest “instantaneous” wind speed), which will be greater than the fastest mile over the same time period. Statistical estimates of the peak gusts expected during periods of 50 and 100 years are reported in the SAR (PFS/SAR 2001) as 88 mph and 94 mph, respectively.

A tornado probability is typically given in terms of the likelihood of a particular location being within a path of tornado damage in any given year, and is expressed either in terms of the expected number of tornadoes per year or its reciprocal, the expected number of years between tornadoes at that particular location. The calculated probabilities are far beyond recorded experience, and, therefore, not always intuitively reasonable. A probability of 1.37 tornadoes per million years (or about 1 tornado per 730,000 years) at the site of the proposed PFSF was obtained by PFS (PFS/ER 2001), based on a typical tornado damage path area of 0.09 km^2 (0.035 $miles^2$). The probability of a tornado creating such a damage path somewhere within an area 10,000 times that large is simply the probability given above multiplied by 10,000, or 0.0137 tornadoes per year. This corresponds to 1 tornado per 73 years within an area of 900 km^2 (350 $miles^2$), which may be thought of as 16 km (10 miles) wide and 56 km (35 miles) long, about the same dimensions as the floor of Skull Valley. To extend this calculation to much larger areas would be meaningless because of the differences in tornado probabilities that are likely to occur in different parts of larger areas (e.g., in the mountains to the east or west).

It was noted by PFS (see PFS/SAR 2001) that Ramsdell and Andrews (1986) give a higher tornado probability, 3.06 in a million, for any particular location in the State of Utah as a whole. Available data would seem to justify estimates of tornado probability ranging from about 1.37 in a million to about 3 in a million, or from about 1 tornado in 33 years to 1 in 73 years occurring somewhere within the 350 square miles area considered above.

A tornado struck downtown Salt Lake City on August 11, 1999; this was the first tornado to strike inside the city limits since 1968. It was also more intense than most tornadoes in Utah; damage-based wind speed estimates were between 100 and 150 mph, leading to a classification of level 2 (i.e., F2) on the Fujita intensity scale. Imprecise measurements of tornado winds, made with Doppler radar, have indicated speeds as high as 318 mph, in an F5 tornado near Oklahoma City on May 3, 1999 (Monastersky 1999; NOAA 1999). However, tornadoes of intensity of F3 or greater, associated with wind speeds greater than about 150 mph (Grazulis et al. 1993), are so infrequent in the Great Basin that calculations of their probabilities are of questionable value. Although the expected damage area of an F3, F4, or F5 tornado is much larger than the more typical value of 0.09 km^2 (0.035 $miles^2$) used above, the probability of occurrence of such a tornado anywhere in Skull Valley is extremely small.

3.3.2 Air Quality

Air quality is evaluated by comparing measured air pollutant concentrations with National Ambient Air Quality Standards (NAAQS), which have been established by the EPA to protect human health and welfare with an adequate margin of safety (40 CFR Part 50). These national standards apply to six

AIR QUALITY DESIGNATIONS

Attainment Area—Any area that meets the national primary or secondary ambient air quality standard for the pollutant.

Nonattainment Area—Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.

common air pollutants, namely: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb), and two sizes of particulate matter: 10 µm or less in diameter, designated PM-10, and 2.5 µm or less in diameter, designated PM-2.5. These are called *criteria pollutants* because the criteria for regulating them must be published (CAA, Section 108). Primary NAAQS define levels of air quality which the EPA deems necessary, with an adequate margin of safety, to protect human health; secondary NAAQS are similarly designated to protect human welfare by safeguarding environmental resources (such as soils, water, plants, and animals) and manufactured materials. Primary and secondary standards are currently the same for all pollutants and averaging periods except for 3-hour SO_2 averages, which have only a secondary standard.

NAAQS are expressed as concentrations of pollutants in the ambient air—that is, the outdoor air to which the general public has access [40 CFR 50.1(e)]. Concentrations of criteria pollutants at locations corresponding to the general guidelines in 40 CFR Part 58, Appendix D, are monitored by EPA to compare air quality with NAAQS. State and local monitoring stations are sometimes available to provide supplementary data. Monitored values of criteria pollutants can be accessed from EPA's Aerometric Information Retrieval System (AIRS) data base, accessible from the EPA home page [(http://www.epa.gov/air/data/monitors.html); accessed February 16, 2000].

Tooele County is in attainment of all NAAQS except for an SO_2 nonattainment classification applicable only to those parts of the county above 5,600 ft in elevation. However, the only SO_2 monitoring in Tooele County was discontinued in October 1997 as a result of the low concentrations that were measured (Utah Department of Environmental Quality 1998). Air quality data for 1995 to 1999 from the monitoring stations nearest to Skull Valley are presented, along with their corresponding standards, in Table 3.3.

The SO_2 standards for periods of 24 hours or less apply to the second highest value in a calendar year at any particular location; therefore, the highest value for each year at each monitor was excluded from the data, and the highest of the remaining values (the highest second-highest value) for 1995–1999 is compared with the standards in Table 3.3. All SO_2 concentrations were less than 15 percent of applicable standards.

Like the SO_2 standards for short-term averages, CO standards apply to the highest second-highest concentrations for each year; these concentrations are presented in Table 3.3. Most monitoring for

Table 3.3. Summary of air quality for the Skull Valley area for 1995–1999

Pollutant	Averaging period	Nearest monitoring location	Year of maximum	National Ambient Air Quality Standard[a]	Concentration[a]	Concentration as a percent of standard
Sulfur dioxide (SO_2)	3-hour[b]	Magna[c]	1995	0.50 ppm	0.040 ppm	8
	24-hour[b]		1995	0.14 ppm	0.015 ppm	11
	Annual[d]		1995	0.03 ppm	0.002 ppm	7
Carbon monoxide (CO)	1-hour[b]	Salt Lake City	1996	35.0 ppm	12.0 ppm	34
	8-hour[b]		1996	9.0 ppm	6.9 ppm	77
Nitrogen dioxide (NO_2)	Annual[d]	Bountiful	1997	0.053 ppm	0.021 ppm	40
Ozone (O_3)	1-hour[e]	Lakepoint	1996	0.124 ppm[e]	0.123 ppm[f]	99
Lead (Pb)	Calendar	Magna	1997	1.5 µg/m^3	0.1 µg/m^3	7
Particulate matter $\leq$10 µm in diameter (PM-10)	24-hour[g]	Magna[c]	1998[g]	150 µg/m^3	87 µg/m^3	58
	Annual[g]		1997[g]	50 µg/m^3	22 µg/m^3	44
Particulate matter $\leq$2.5 µm in diameter (PM-2.5)[g]	24-hour	g		65	g	g
	Annual	g		15	g	g

[a]Standards and monitored concentrations are expressed as parts per million (ppm) by volume for gases, and as micrograms per cubic meter (µg/m^3) for lead and particulate matter (40 CFR Part 50).

[b]The highest value for each year has been excluded and the highest of the remaining concentrations is shown for comparison with the standard, as per 40 CFR Part 50.

[c]Grantsville was the nearest monitoring station until 1997; Magna is now the nearest station. Concentrations at Grantsville were generally lower than those at Magna.

[d]The maximum annual (or, for lead, quarterly) concentration during 1995–1999.

[e]The hourly ozone standard applies to the fourth highest value in any three successive years. An 8-hour standard for ozone was promulgated by EPA in 1997 (FR 62 38856); however, legal challenges to that standard resulted in a decision by the U.S. Supreme Court on February 27, 2001 which directed EPA to develop a reasonable approach to implementing the standard [Whitman v. American Trucking Assn., Inc., 531 US 457 (2001)]. Further developments in this area are only speculative at this time.

[f]The value given is the 4th highest during 1996–1998; during that period, the standard has exceeded the maximum allowable three times and the highest measured hourly concentration was 0.145 ppm at the Lakepoint monitor. The next nearest ozone monitor is in Herriman, where the 4th highest value in any successive three years was 0.111 ppm, and the highest value was 0.115 ppm. On July 18, 1997, EPA promulgated an 8-hour ozone standard. However, the U.S. Supreme court directed EPA to develop a different standard. See Whitman v. American Trucking Assn. Inc., 531 US 457 (2001).

[g]The 24-hour standard is not to be exceeded more than three times in three years, and the annual average refers to the average of three successive annual values (40 CFR Part 50, Appendix K). Years listed as providing the maximum values refer to the ending year of the corresponding 3-year period. On July 18, 1997, EPA promulgated new standards for particulate matter less than 2.5 µm in diameter (PM-2.5) (62 Fed. Reg. 38652). These standards have now survived court challenges, and will become effective when sufficient monitoring data are in place. It is expected that these standards will become effective during construction or operation of the proposed facility.

Source: http://www.epa.gov/air/data/monitors.html; accessed February 16, 2000.

CO is in large cities where traffic congestion leads to long idling times of large numbers of commuter vehicles during rush hour; CO is not generally a pollutant of concern outside of large cities. In Salt Lake City, 8-hour average CO concentrations were as high as 77 percent of the standard during 1996.

Only an annual standard exists for NO_2; annual average NO_2 concentrations at the nearest monitoring station over the past 5 years have always been less than 50 percent of the standard. The 1-hour ozone standard requires that no more than three days in any 3-year period have one or more hourly concentrations in excess of 0.12 ppm by volume (40 CFR Part 50) [when rounded to two decimal places in accordance with EPA guidance (see EPA 1979)]. Although concentrations higher than 0.12 ppm occasionally occurred, ozone concentrations never exceeded the standard more than three times in any 3-year period at the nearest monitoring location, in Lakepoint. At the next-nearest monitor, in Herriman, no ozone concentration over the 1-hour ozone standard was recorded from 1995 to 1999.

An 8-hour standard for ozone was promulgated by EPA in 1997 (62 FR 38856); however, legal challenges to that standard resulted in a decision by the U.S. Supreme Court on February 27, 2001 which directed EPA to develop a reasonable approach to implementing the standard [Whitman v. American Trucking Associations, Inc., 531 US 457 (2001)]. Further developments in this area are only speculative at this time. However, the Supreme Court did not question the level of the standard, which is 84 parts of ozone per billion parts of ambient air on a volumetric basis, applicable to the 3-year average of each year's 4th highest daily maximum 8-hour average. The 8-hour averages presented by the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) (STAPPA/ALAPCO, 2001) indicate that the new standard is exceeded (by less than 5%) at all 4 monitoring stations in Salt Lake County that have data for 1998, 1999, and 2000.

Lead concentrations in the Salt Lake City area have been less than 10 percent of the standard over the past several years; atmospheric concentrations of lead have been declining in recent years, largely as a result of the reduced use of leaded gasoline.

Standards for particulate matter apply to statistical values derived from three years of data. Near Skull Valley, maximum PM-10 concentrations have recently been around 50 percent of their corresponding standards.

The NAAQS for PM-2.5 were promulgated in 1997. A multi-year data set sufficient for estimating background concentrations is not yet available, nor are generally accepted estimates of construction emissions for use in atmospheric dispersion modeling. It is expected, however, that, for practical purposes, the NAAQS for PM-2.5 will become effective during construction or operation of the proposed facility.

In addition to NAAQS, which represent an upper bound on allowable pollutant concentrations, there are national standards for the prevention of significant deterioration (PSD) of air quality (40 CFR 51.166). The PSD standards differ from the NAAQS in that the NAAQS specify maximum allowable *concentrations* of pollutants, while PSD requirements provide maximum allowable *increases in concentrations* of pollutants for areas already in compliance with the NAAQS (i.e., in attainment). PSD standards are therefore expressed as allowable *increments* in the atmospheric concentrations of specific pollutants. PSD increments are particularly relevant when a major proposed action (e.g., involving a new source or a major modification to an existing source) may degrade air quality without exceeding the NAAQS, as would be the case, for example, in an area where the ambient air is very clean. Allowable PSD increments currently exist for three pollutants (NO_2, SO_2, and PM-10). One set of allowable increments exists for Class II areas, which cover most of the United States, and a much more stringent set of allowable increments exists for Class I areas, which are specifically designated areas where the degradation of ambient air quality is to be severely restricted. Class I areas include many national parks and monuments, wilderness areas, and other areas as specified in 40 CFR 51.166(e). The nearest Class I PSD area is the Capitol Reef National Park, about 240 km (150 miles) south-southeast of the site of the proposed PFSF.

There are no Federal requirements for applying standards for the prevention of significant deterioration (PSD) of air quality to temporary, construction-related, activities such as those associated with the proposed PFSF, and discussed in Section 2.1, or to stationary sources, such as the facility itself, which would not emit significant amounts of pollutants as defined in 40 CFR 51.166.

3.4 Ecological Resources

This section describes the ecological resources of Skull Valley in the vicinity of the proposed and alternative sites for the proposed PFSF, the related transportation corridors, and the ITF near Timpie. The emphasis of this description is on selected plant and animal species, biodiversity, and ecosystems of special concern to the FWS, BLM, and the Utah Division of Wildlife Resources (UDWR) that may be individually or cumulatively affected by the proposed action or alternatives. The concern for potential effects on these resources stems primarily from their importance as threatened, endangered, or special concern species; game species; indicator species; or ecosystems in danger of being eliminated or becoming less diverse.

3.4.1 Terrestrial Resources

3.4.1.1 Vegetation

Skull Valley is located in the saltbush-greasewood (*Atriplex-Sarcobatus*) section of the Intermountain Sagebrush Province (Bailey 1980; Küchler 1964). This ecosystem consists of open stands of low and dwarf shrubs, dominated by species such as shadscale (*Atriplex confertifolia*) and greasewood (*Sarcobatus vermiculatus*). The mountains on the east and west sides of the valley are classified as juniper-pinyon pine woodland (Küchler 1964) consisting of open groves of low evergreen trees with varying admixtures of shrubs and herbaceous plants. Common trees and shrubs in the valley include big sagebrush (*Artemisia tridentata*), saltbush species (*Atriplex* spp.), shadscale, rabbitbrush species (*Chrysothamnus* spp.), and greasewood, among others (Ehleringer undated). The most abundant grass is an exotic annual weed, cheatgrass (*Bromus tectorum*).

Biological soil crusts (also known as cryptogamic or cryptobiotic soil crusts) commonly occupy the nutrient-poor zones between vegetation clumps in such arid ecosystems (Belnap et al. undated). These crusts are a complex mosaic of living organisms, including algae, cyanobacteria (also known as blue-green algae), bacteria, lichens, mosses, liverworts, and fungi (BLM undated). Biological soil crusts photosynthesize, provide habitat for fauna, stabilize soil, increase soil fertility by fixing nitrogen, help the soil retain moisture, enhance seedling establishment, help keep out unwanted plants (for example, exotic weeds), and absorb energy from the sun (Belnap 1994, Belnap et al. undated, BLM undated). Small amounts of these soil crusts are located in the proposed project area as described in the Tooele County Soil Survey and corresponding range site descriptions.

Due to numerous, large fires (primarily caused by lightning) and the aggressive nature of overgrazing, cheatgrass has invaded and replaced the natural vegetation in much of Skull Valley (BLM 1998c).

Within the Intermountain Region, extensive wildfires frequently occur on disturbed range and wildlands occupied by annual weeds (Monsen 1995). Wildfires now occur in Skull Valley with a frequency of at least once every three years. Fire can damage vegetation, but it can also stimulate growth and succession (Wright and Bailey 1982). In areas of desert shrub and saltbush vegetation, repetitive fires destroy the native species (BLM 1998c). Since desert shrub and saltbush cannot compete with annual grasses, they do not naturally reestablish; instead, almost pure stands of annual grass become established. Once annual grasses invade, an area becomes increasingly susceptible to subsequent fires. However, if fires do not occur every 3 to 5 years, the salt desert shrub would naturally become reestablished.

The Salt Lake District of BLM has adopted a fire management plan for all the resource management areas in the district, including the Pony Express area that covers Skull Valley (BLM 1998c). Most of Skull Valley falls into the fuel type categorized by BLM as annual grass with desert shrub in which wildland fire is not desired. In Skull Valley BLM's goal is to reduce fire size by using fuel or vegetation management procedures (e.g., prescribed fire, mechanical manipulation, seeding to less flammable and more desirable species, fuelbreak establishment). Prescribed fires and mechanical or chemical treatments would generally be limited to black stripping (i.e., creating a fuelbreak by removing all vegetation), as either a hazardous fuel reduction method or as site preparation for green stripping projects (i.e., creating a fuelbreak by planting naturally fire-resistant vegetation). The goal of the 1998 Fire Management Plan is to contain 90 percent of fires of all intensity levels at 121 ha (300 acres) or less and to contain fires in areas that consist primarily of native desert shrub species and perennial grasses at 40 ha (100 acres) or less. According to BLM, these objectives may be difficult to achieve under ideal conditions and will require aggressive suppression efforts to achieve.

The proposed and alternative PFSF sites are nearly flat and are dominated by widely-spaced desert shrub species, perennial grasses, and annuals. Figure 3.6 shows the vegetative micro-communities that were identified on the proposed and alternative sites (Stone and Webster 1996). As shown in Figure 3.6, the proposed site (Site A) is about 70 percent grass and 30 percent bare ground. It is mainly vegetated by grasses, with the northeast corner being a community of primarily low shrubs. The alternative site (Site B) has a greater diversity of micro-communities, with shrubs and grasses being the dominant vegetation types. Vegetation observed on the preferred site and along the proposed access road to it includes cheatgrass, sagebrush, shadscale, saltbush, tumbleweed (*Amaranthus albus*), various species of cacti, greasewood, and freckled milkvetch (*Astragalus lentigenosus*). With the exception of the Skull Valley Band village, no trees are located within 8 km (5 miles) of the proposed PFSF site (PFS/ER 2001).

The vegetation at the proposed Skunk Ridge railhead and along the proposed Skunk Ridge rail corridor on the west side of Skull Valley is generally very similar to that found at the proposed and alternative PFSF sites and along Skull Valley Road and includes areas dominated by cheatgrass (PFS/RAI1 1999). The habitat on the west side of Skull Valley is in general, somewhat more open than that on the east side.

The area of the ITF near Timpie is highly disturbed, with no unique ecological communities (PFS/ER 2001). It is dominated by greasewood with native salt desert shrubs and native grasses being sparse to virtually absent (PFS/ER 2001).

Plant species that are considered threatened, endangered, and species of special concern are discussed in Section 3.4.3.1.

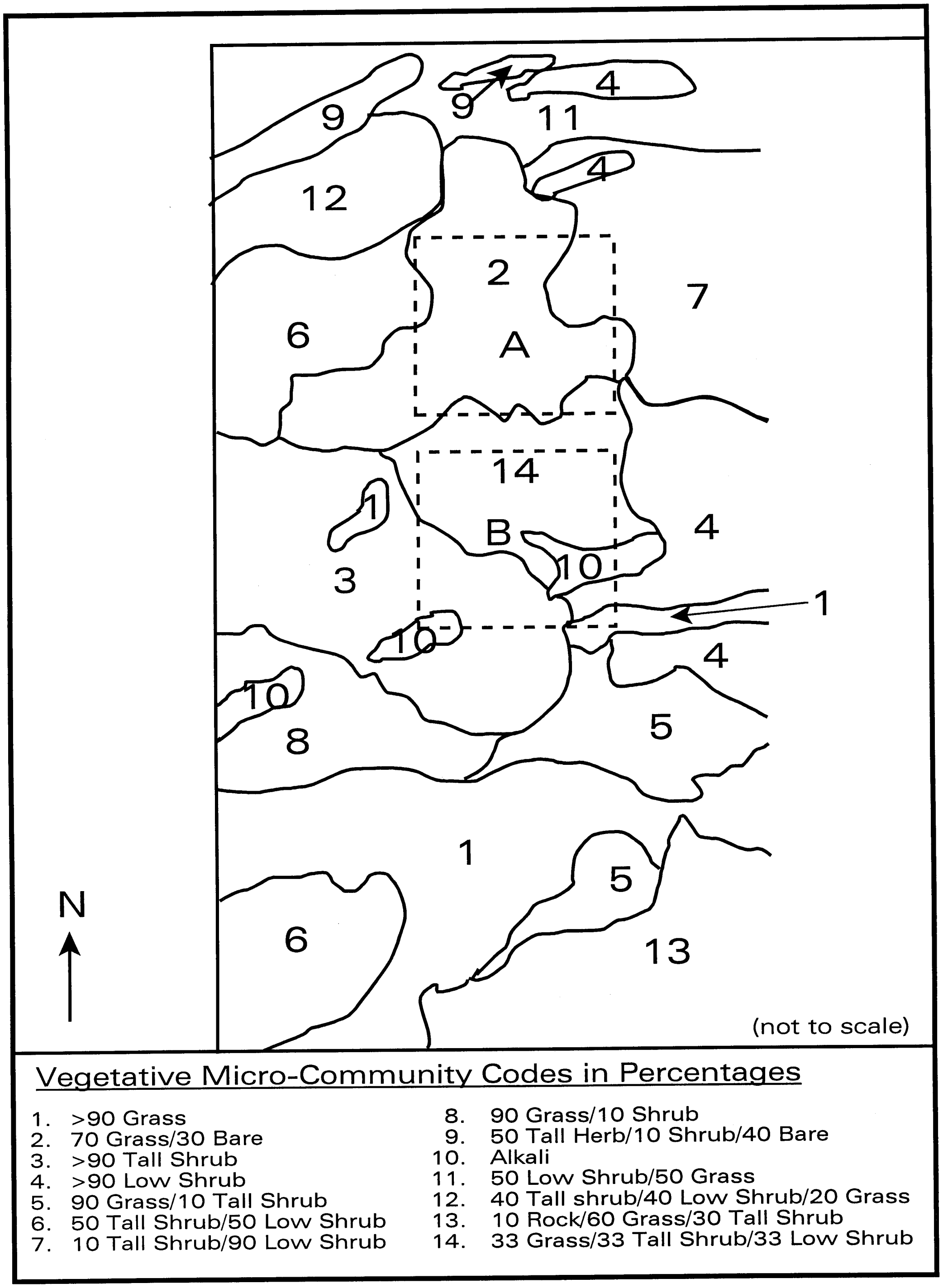


Figure 3.6. Vegetative micro-communities on the proposed PFSF site (Site A) and the alternative site (Site B) on the Reservation.

3.4.1.2 Wildlife

The open habitats of Skull Valley support a number of wide ranging wildlife species including, among others, pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus)*, eagles, owls, and a variety of hawks including ferruginous (*Buteo regalis*), rough-legged (*Buteo lagopus*) (winter) and Swainson's hawks (*Buteo swainsoni*), and northern harriers (*Circus cyaneus*). The valley [108,400 hectares (271,000 acres)] offers open areas in which these animals may feed, hunt, and winter (BLM 1998; UDWR 1999).

Typical mammal species found in the vicinity of the proposed project site include ground squirrels (*Citellus sp.*), jack rabbits (*Lepus sp.),* kangaroo rats (*Dipodomys sp.*), mice (*Peromyscus sp.*), coyote (*Canis latrans*), fox (*Vulpes sp.*), badger (*Taxidea taxus*), and skunk (*Mephitis mephitis*) (PFS 1998). Pronghorn antelope, mule deer(both big game species), and wild non-native (i.e., feral) horses were observed during various surveys in 1998. Skull Valley is an important winter area for these three animal species (UDWR 1999).

There are approximately 850 mule deer in the West Desert Herd and 13,400 in the Stansbury Herd. Mule deer use both the Cedar and Stansbury mountains and move down in the valley during the winter. Wintering areas identified by UDWR are to the north of the Reservation, to the east of Skull Valley Road, and in the foothills of the Cedar Mountains (see Figure 3.7). It is likely that mule deer would occur in the vicinity of the PFS site, along Skull Valley Road, and along the Skunk Ridge rail line corridor (UDWR 1997a and 1999).

Pronghorn antelope in Skull Valley are part of the West Desert Herd Unit 2, consisting of approximately 130 animals. This herd, for the most part, uses areas to the west, north, and south of Skull Valley (PFS/ER 2001; UDWR 1999).

A herd of approximately 350 feral horses occupies the Cedar Mountains Wild Horse Herd Management Area. This area encompasses the Cedar Mountains from Hastings Pass near I-80 on the north to the Dugway Proving Ground on the south. The southern portion of the Cedar Mountains is a wild horse herd management area. BLM's management goals are to keep the horses within the herd area and maintain an appropriate level of horses based on the amount of vegetation. The Skunk Ridge rail line corridor may be used as feeding areas by these animals, especially during the winter (UDWR 1999; BLM 1988a and 1998).

Birds common to the proposed PFSF site and proposed Skunk Ridge rail line corridor include common raven (*Corvus corax*), black-billed magpie (*Pica pica*), western meadowlark (*Sturnella neglecta*), lark sparrow (*Chondestes grammacus*), horned lark (*Eremophila alpestris*), ferruginous hawk, and kestrel (*Falco sparverius*). Hawk nesting habitat is present along Skull Valley Road, at Hickman Knolls to the south of the proposed PFSF site, in the foothills of both the Cedar and Stansbury Mountains, and in areas where trees occur in Skull Valley. Numerous hawk nesting sites have been identified throughout the valley, including along Skull Valley Road and the proposed Skunk Ridge rail line corridor (PFS/ER 2001; Stone & Webster 1998; UDWR 1997a). Various hawk species currently use the proposed PFSF site as well as the Skunk Ridge rail line corridor as part of their feeding territories.

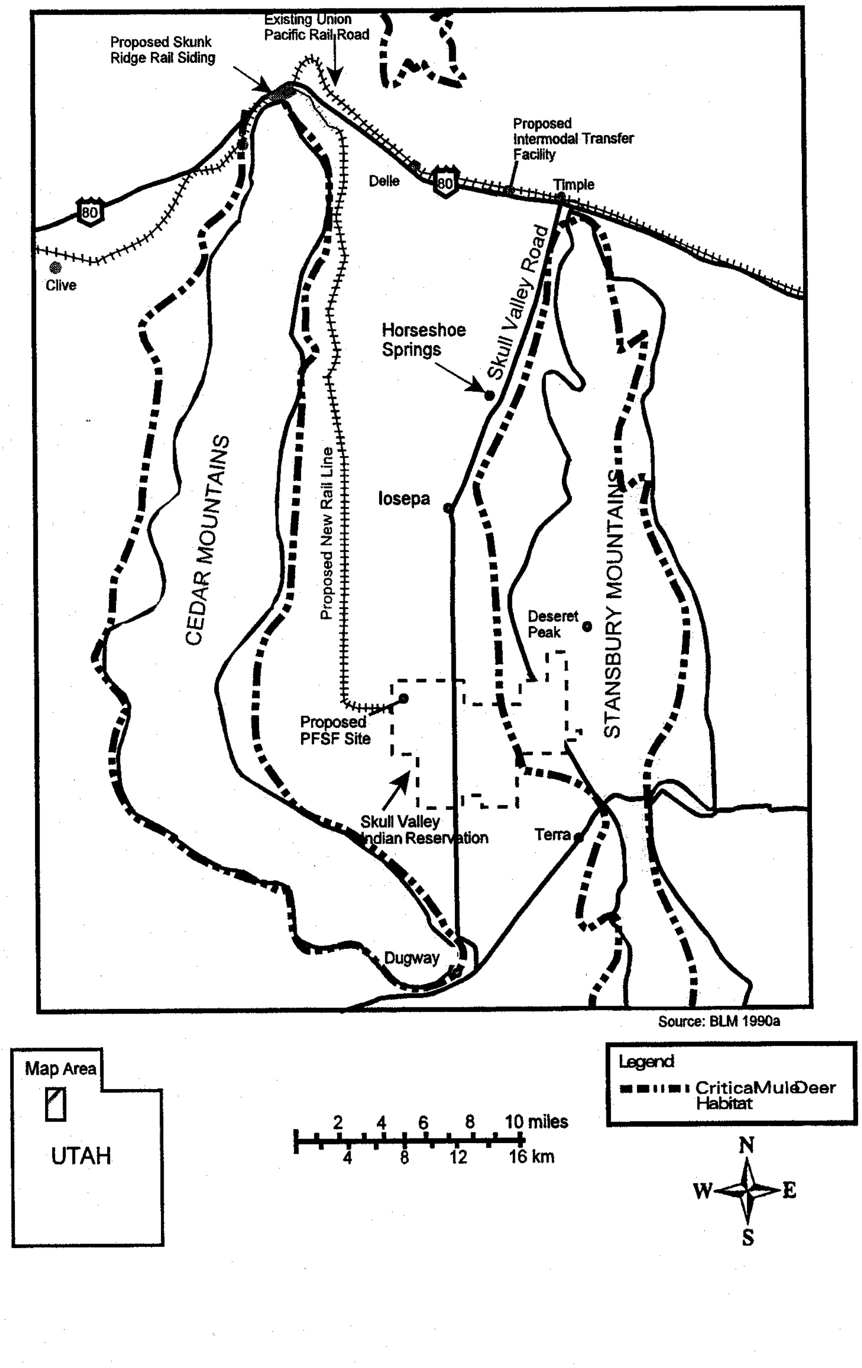


Figure 3.7. Critical mule deer habitat within Skull Valley.

A number of upland game species are found in Skull Valley. These species include Hungarian partridge (*Perdix perdix*), ring-necked pheasant (*Phasianus colchicus*), chukar (*Alectoris chukar*), and mourning dove (*Zenaida macroura*). Hungarian partridge, ring-necked pheasant, and chukar are exotic game species (National Geographic Society 1983). Partridge and pheasant prefer areas of small grain crops. Areas just north of the Reservation are used to grow alfalfa. UDWR indicate that use areas for both the partridge and pheasant are present within one half mile of Skull Valley Road, north of the project site (UDWR 1999). Chukars are common within habitats of the foothills and slopes of the Stansbury and Cedar Mountains (PFS/ER 2001; UDWR 1997a; UDWR 1999). Chukars may use areas within the proposed Skunk Ridge railroad corridor and just east of Skull Valley Road north of the proposed PFSF site (UDWR 1999). The mourning dove, a native game species, is common throughout Skull Valley, including the Reservation, the Skunk Ridge corridor, and along Skull Valley Road.

Waterfowl, shorebirds, and wading birds use mudflats and wetlands (e.g., Horseshoe Springs) in the northern portions of the valley (see Section 3.4.2.2 for more information on wetlands wildlife). In addition, the Great Salt Lake, approximately 45 km (30 miles) north of the proposed site and 5 km (3 miles) northeast of the proposed Timpie ITF area, is important for migratory birds. The lake supports between 2 and 5 million shorebirds and hundreds of thousands of waterfowl during spring and fall migration (USGS 2000). Because of its importance to migratory birds, the lake was designated a part of the Western Hemisphere Shorebird Reserve Network in 1992. The lake and its marshes provide a resting and staging area for the birds, as well as an abundance of brine shrimp and brine flies that serve as food. The Migratory Bird Treaty Act of 1918, as amended, 16 USC 703, *et seq.*, protects migratory birds included in the terms of the conventions identified in 16 USC 703

The habitats of the proposed new rail line which is to run south from Skunk Ridge, to the west and north of the proposed PFSF site, are very similar to most of Skull Valley, although, as mentioned in Section 3.4.1.1, the vegetation is somewhat more widely spaced.

The proposed ITF near Timpie is near both Interstate-80 and the Union Pacific railroad. It is a previously disturbed site with little current value to wildlife.

Threatened, endangered and other species of special concern are discussed in Section 3.4.3.

3.4.2 Aquatic Resources

3.4.2.1 Perennial and Ephemeral Streams

As discussed in Section 3.2.1.1, Indian Hickman Creek is the stream nearest to the proposed PFSF site. The creek is fed from springs in the Stansbury Mountains and has moderate flow in the wet season. Trout are known to inhabit the creek.

There are no perennial streams found within the area of the proposed or alternative PFSF sites, along the Skunk Ridge transportation corridor, or at the ITF near Timpie. A number of ephemeral stream channels, essentially dry washes, are identified on USGS quadrangles within an 8-km (5-mile) radius of the proposed PFSF site and within 0.8 km (0.5 mile) of the Skunk Ridge transportation corridor. Some of these ephemeral streams may be identified as “waters of the United States” by the Corps of Engineers. However, because of their ephemeral nature, none of them would be expected to support any aquatic biota.

3.4.2.2 Wetlands

Wetlands are important to a wide variety of wildlife, livestock, watershed, and recreation values (BLM 1992a) and are used by wildlife disproportionately more than any other type of habitat (Bridges et al. 1998). Although such areas comprise less than 9 percent of all land in the United States administered by BLM, they are the most productive and highly prized resources found on BLM lands (Bridges et al. 1998). In regions such as Utah where water is scarce, roughly 90 percent of the birds and most of the mammals use wetland and riparian habitats during some part of their life cycle (Stewart 1998).

Wetlands are uncommon in Skull Valley. There are none on the proposed or alternative PFSF site (PFS/ER 2001) or along the Skunk Ridge transportation corridor. Some wetlands are found near Skull Valley Road in the northern part of Skull Valley. These wetland areas support plants such as three-square bulrush (*Scirpus pungens*), spikerush (*Eleocharis palustris*), and saltgrass (*Distichlis spicata*) (BLM 1992a). The wetland area in northern Skull Valley, identified by BLM as the Horseshoe Springs Wildlife Habitat Area (WHA), consists of 25,611 ha (63,286 acres), of which BLM manages almost 85 percent (BLM 1992a) (see Figure 3.8). This area provides crucial habitat for many species of wildlife, as it supplies the only major public water source in Skull Valley for miles around and, thus, it attracts a large variety of wild animals.

Of the wetlands in the WHA, the most obvious and largest one is the 308-ha (760-acre) area surrounding Horseshoe Springs, which has been designated an Area of Critical Environmental Concern (ACEC) by BLM (BLM 1990). An ACEC designation protects and recognizes the unique, environmentally sensitive, wetlands and springs within that region. Horseshoe Springs is located approximately 24 km (15 miles) north of the proposed facility site, 335 m (1,100 ft) west of Skull Valley Road, 11 km (7 miles) from the rail corridor, and nearly 16 km (10 miles) from the proposed ITF near Timpie. Other, smaller springs also occur to the north and south of Horseshoe Springs (see Figure 3.8), but only Horseshoe Springs supports fish and snails (BLM 1992a).

These wetlands are used by many wildlife species such as falcons, hawks, owls, gulls, shorebirds [e.g., willets (*Catoptrophorus semipalmatus*), American avocets (*Recurvirostra americana*), and black-necked stilts (*Himantopus mexicanus*)], wading birds (e.g., herons, ibises), ducks, swallows, muskrats (*Ondatra zibethicus*), and various amphibians and fish species. Mink also use northern portions of Skull Valley along Skull Valley Road (UDWR 1997a).

3.4.3 Threatened, Endangered, and Other Species of Special Concern

Table 3.4 lists all species of special concern known to be on or in the vicinity of the proposed PFSF site or along the transportation corridors in Skull Valley. This list is also applicable to Site B in Skull Valley. Consultation with the FWS has been conducted to comply with Section 7 of the Endangered Species Act (see Appendix B).

3.4.3.1 Plants

No Federal listed threatened, endangered, proposed, or candidate plant species are known to or likely to occur in Skull Valley. The FWS identified Ute ladies'-tresses (*Spiranthes diluvialis*), a Federally listed threatened species, as a species that may occur in the area of the proposed action. (See Appendix B, letter dated June 22, 1999, from Reed E. Harris, FWS, to Mark Delligatti, NRC). One

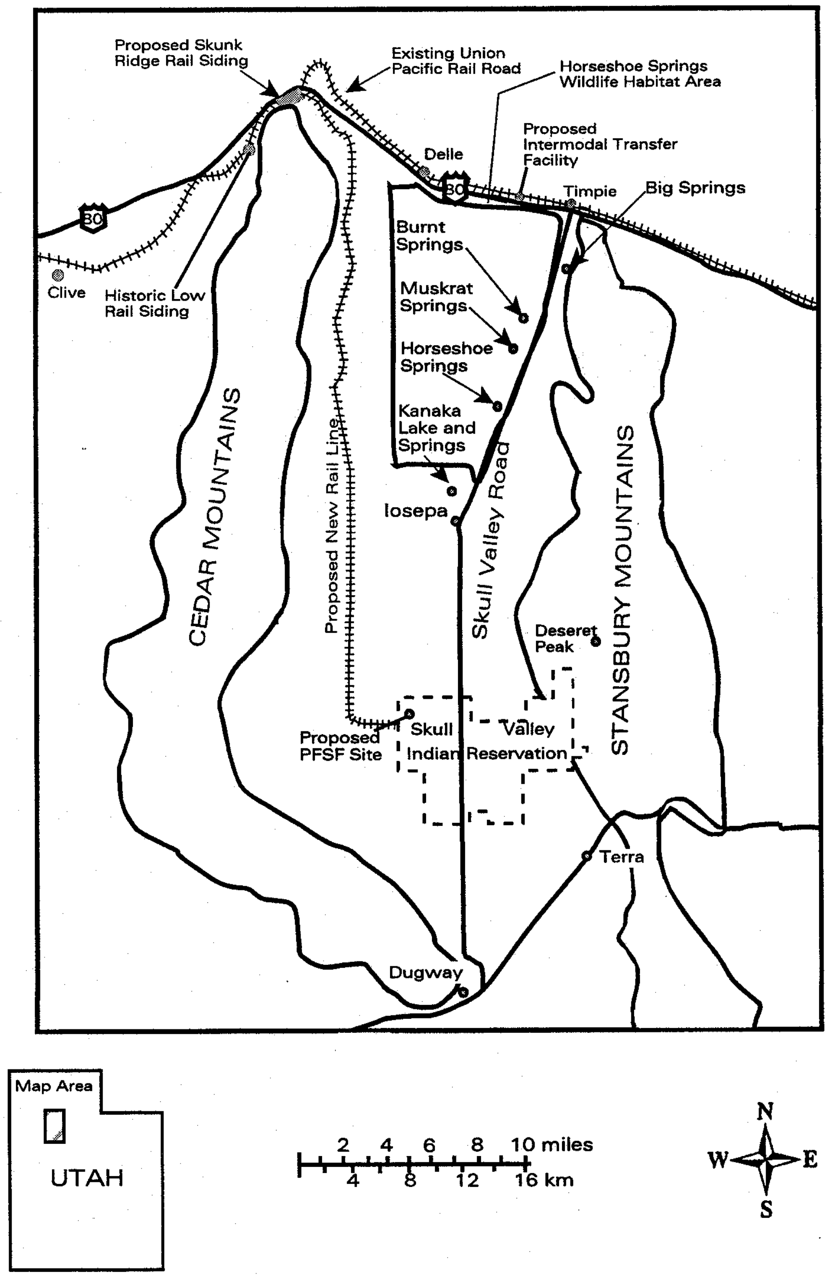


Figure 3.8. Location of major springs in Skull Valley.

Table 3.4. Skull Valley Federal and State species of special concern expected to use or be present at or near the proposed PFSF site or alternate Site B or along the Skunk Ridge rail corridor

Common name	Scientific name	State status[a]	Federal status[a]
Plants			
Pohl's milkvetch	*Astragalus lentiginosus* var. *pohlii*	UDWRS1, CC	BLM2
Mammals			
Kit fox	*Vulpes macrotis*	—	BLM1
Skull Valley pocket gopher	*Thomomys bottae robustus*	CC	BLM1
Birds [present year-round, except as noted by (s) for summer or (w) for winter]			
Long billed curlew	*Numenius americanus*	SS	BLM1
Bald eagle (w)	*Haliaeetus leucocephalus*	SE	FT[b]
Golden eagle	*Aquila chrysaetos*	Int	BLM Int
Kestrel	*Falco sparverius*	Int	BLM Int
Peregrine falcon	*Falco peregrinus*	SE	NL
Prairie falcon	*Falco mexicanus*	Int	BLM Int
Northern harrier	*Circus cyaneus*	Int	BLM Int
Ferruginous hawk	*Buteo regalis*	ST	BLM1
Red-tailed hawk	*Buteo jamaicensus*	Int	BLM Int
Rough-legged hawk (w)	*Buteo lagopus*	Int	BLM Int
Swainson's hawk (s)	*Buteo swainsoni*	SS	BLM1
Burrowing owl (s)	*Athene Speotyto cunicularia*	SS	BLM1
Great-horned owl	*Bubo virginainus*	Int	BLM Int
Short-eared owl	*Asio flammeus*	SS	BLM1
Loggerhead shrike (s)	*Lanius ludovicianus*	—	BLM1
Turkey vulture (s)	*Cathartes aura*	Int	BLM Int
Amphibians			
Great Basin spadefoot toad[c]	*Spea intermontanus*	P	NL

[a]SE = State Endangered; ST = State Threatened; SS = State Sensitive; S1 = State Rank, typically 5 or fewer occurrences, rarity makes it vulnerable to extirpation; CC = Conservation Concern; BLM1 = Sensitive; BLM2 = potential; Int = State species of interest; BLM Int = BLM species of interest; P = State protected; NL = not Federally listed; FT = Federal threatened.

[b]On July 6, 1999, the FWS proposed to remove the bald eagle from the list of Endangered and Threatened species (see 64 Fed. Reg. 36454).

[c]Not expected to occur in the PFSF site but could potentially be present along the proposed Skunk Ridge rail corridor.

Sources: Utah Division of Wildlife Resources, Biological Assessment, 3/27/97; Utah State Sensitive Species List, 3/97; Letters from Reed Harris of Fish and Wildlife Service, 7/31/98 and 6/22/99; and Survey for the Site and Low Corridor, 7/30/98; Letter from John Kimball of Utah Division of Wildlife Resources, 1/6/99; PFS/ER 2001; Letter from Ron Bolander of BLM, 4/1/99; Letter from G. William Lamb, 6/30/98.

BLM special status plant that is rare in the state, Pohl's milkvetch (*Astragalus lentiginosus* var. *pohlii*), and one plant species that is of State conservation concern, small spring parsley (*Cymopterus acaulis* var. *parvus*), could occur there.

Special status plants are those plants found on public lands administered by BLM whose survival is of concern due to their limited distribution, low number of individuals or populations, or potential threats to habitat (BLM 1999b). BLM uses the term "special status plants" to include Federal endangered, threatened, proposed, and candidate species; State endangered, threatened, and rare species; and BLM sensitive plants. Sensitive plants are those species that do not occur on Federal or State lists, but are designated by the BLM State Director for special management consideration. BLM manages the conservation of special status plants and their associated habitats to ensure that actions it authorizes, funds, or carries out do not contribute to the need to list any species as threatened or endangered. The Utah State BLM Office maintains a list of all known and suspected special status plants on BLM lands.

Ute ladies'-tresses are found only in moist soils, in moist or wet meadows, and near springs, lakes, or perennial streams. A population of the species was last collected from Tooele County in 1956 at Willow Springs near the town of Callao (57 Fed. Reg. 2048, Jan. 17, 1992). Recent searches for the species in the Great Basin have failed to rediscover this historic population or any new populations. Since appropriate habitat for this species is not found in the area of the proposed action, it is unlikely to occur there.

A rare plant field survey was conducted in 1998 in Skull Valley in the area of the proposed PFSF and rail line (Kass 1998a, 1998b). Of the plant species that were suggested as potentially occurring within the proposed action area, only Pohl's milkvetch was found. Approximately six plants were discovered about 2.5 km (1.5 miles) southeast of the OCA for Site A on an abandoned road to Hickman Knolls, about 1 km (0.6 mile) southwest of Skull Valley Road. None were found on the proposed PFSF site or rail line. The six Pohl's milkvetch plants are located about 3.7 km (2.3 miles) from the center of the proposed storage pad area at Site A. Another Pohl's milkvetch plant was located in the same general area, but closer to Skull Valley Road.

Pohl's milkvetch, which occurs in greasewood communities at elevations of 1,330 to 1,650 m (4,364 to 5,414 ft) (Welsh et al. 1987), was formerly a Federal Category 2 candidate species (i.e., a species that was considered rare but for which the FWS did not have sufficient data available to support a proposed rule to list it as threatened or endangered). Although numerous varieties of this species are known to occur in Utah (Welsh et al. 1987), and this variety is endemic to Rush and Skull valleys, it is nonetheless considered rare in the State (i.e., it has a known or suspected rangewide viability concern) (UDWR 1998).

Small spring parsley, another species that was suggested as potentially occurring within the proposed action area, grows in desert shrub, sagebrush, and juniper communities at 1,400 to 1,585 m (4,593 to 5,200 ft) in Millard and Tooele counties (Welsh et al. 1987). Neither the plant itself nor suitable habitat for it was found in the area surveyed in Skull Valley (Kass 1998a, 1998b). Also, there are no records of it ever being located in the project area.

3.4.3.2 Wildlife

State and Federally listed wildlife species that are expected to use or be present at or near the proposed PFSF site or Site B or in habitats along the proposed Skunk Ridge rail corridor, are listed in Table 3.4. This table includes species that are listed by the FWS, the BLM, or the State of Utah. Other listed species discussed below have been mentioned by State or Federal agencies as potentially being in the area of the proposed site or in Skull Valley.

Federal threatened. Bald eagles (*Haliaeetus leucocephalus*) are Federally threatened and listed by Utah State as endangered. These birds are Federally protected under both the Endangered Species Act of 1973, as amended and the Bald and Golden Eagle Protection Act of 1940, as amended. The bald eagle has recently been proposed to be removed from the Federal endangered and threatened species list (64 Fed. Reg. 36454, July 6, 1999). Bald eagles winter in the Rush Valley near Rush Lake, over 32 km (20 miles) east of Skull Valley. During winter, bald eagles hunt in Skull Valley with roosting sites not far from the Reservation (see Figure 3.9). There are only four known bald eagle nest sites in Utah. The closest of these nest locations is on the Jordan River, over 113 km (70 miles) east of Skull Valley (UDWR 1997a).

State endangered. Peregrine falcons (*Falcon peregrinus*) have been removed from the Federal endangered species list (64 Fed. Reg. 46542, Aug. 25, 1999), but they are still Utah State-listed as endangered. The FWS removed the species from the Federal list after determining that it had recovered since the initial listing in 1970. Recovery was attributed primarily to restrictions on use of chlorinated pesticides (e.g., DDT, DDE) in the United States and Canada and to implementation of successful management activities, including captive breeding and releases of falcons within their historical range. These actions have resulted in a large increase in the numbers of birds in the United States. The number of peregrines nesting in Utah has increased greatly and continues to increase, and their distribution in the state has expanded (Messmer et al. 1998). When the species was removed from the Federal list in 1999, 164 pairs were known to occur in the state.

To aid in recovery of the species, a number of nesting towers—based on the historic distribution of peregrines in Utah—were placed around the shores of the Great Salt Lake, all of which have been used successfully for breeding. In addition, falcons are now also successfully breeding at locations around the Great Salt Lake other than the towers erected for that purpose. Timpie Springs was documented as an historic peregrine nesting site in a 1973 study (White 2001). It was, therefore, selected as a reintroduction site in the mid-1980s, and a nesting tower was placed in the Timpie Springs Waterfowl Management Area (WMA) in 1983. This tower was first occupied in 1988, and birds nesting there have successfully fledged young every year since then, except for a four-year period in the late 1990's. This nest is approximately 40 km (25 miles) north of the proposed PFSF site and about 5 km (three miles) east of the proposed ITF near Timpie. While the Skunk Ridge corridor and the proposed PFSF site do not include appropriate nesting habitat, peregrine falcons may use these areas for feeding (Stone & Webster 1998; PFS/ER 2000).

State threatened. The ferruginous hawk (*Buteo regalis*) is Utah State-listed as threatened. This hawk is a year-round resident of Skull Valley. It is known to nest in the foothills of the Cedar Mountains, west of the proposed PFSF site, and within the proposed Skunk Ridge rail line corridor. It nests on rock outcrops and cliffs and forages widely in valleys (UDWR 1997b). Ferruginous hawks have been sighted frequently near the proposed PFSF site and probably use the area for hunting.

State-listed species on tribal trust lands are not protected by state law; however, the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act do apply.

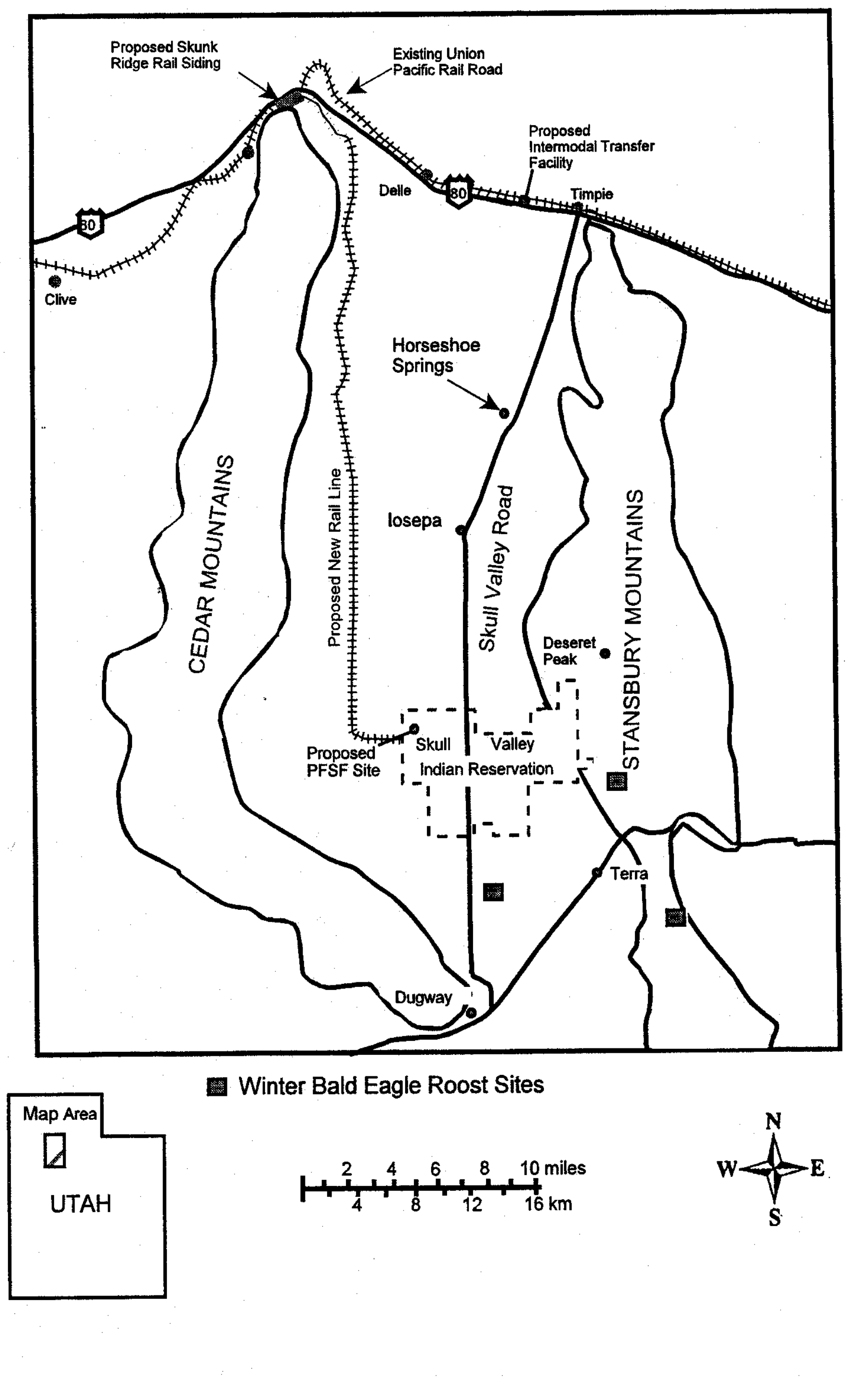


Figure 3.9. Winter roost sites for bald eagles in Skull Valley.

Federal candidate species. The mountain plover (*Charadrius montanus*) is a Federal candidate species. Candidate species are plants and animals native to the United States for which the FWS has sufficient information on biological vulnerability and threats to justify proposing to add them to the threatened and endangered species list, but cannot do so immediately because other species have higher priority for listing. The mountain plover, a neotropical migrant, is frequently associated with prairie dog colonies and nests in upland grass and shrub habitats, which do not occur on the proposed PFSF site. A small population of plovers is known to nest in the Uinta Basin, over 160 km (100 miles) east of Skull Valley (UDWR 1997b). There are no known populations of mountain plovers in Skull Valley and according to the UDWR, the mountain plover is not a concern because it is unlikely to occur in Skull Valley (PFS/ER 2001).

Conservation agreement species. A conservation agreement species is one which the State of Utah has identified as part of its goal to ensure the long-term conservation of the species within its historic range and assist in the development of statewide and rangewide conservation efforts (UDNR 1997; UDNR 1998). One such species is the least chub (*Iotichthys plegethontis*). This fish is in the minnow family (*Cyprinidae*) and occurs in springs, marshes, and stream habitats. Typically, it prefers the same habitats (i.e., shallow water wetlands of the west desert areas of Utah) as those inhabited by spotted frogs *(Rana luteiventris*) (UDNR 1997). This chub was previously proposed to be Federally listed as endangered but this proposal was withdrawn (64 Fed. Reg. 41062, July 29, 1999). Implementation of protective measures documented in the Conservation Agreement from 1997 has greatly reduced the possibility of the chub becoming endangered in the foreseeable future. The closest least chub populations to the project PFSF site are over 80 km (50 miles) to the southeast of the proposed action location (UDNR 1997).

The spotted frog is also a State conservation agreement species. This frog has been a Federal candidate species and recently, as a result of implementing protective measures documented in the Conservation Agreement of 1998 for the species, the threat of this species becoming endangered in the foreseeable future has been substantially reduced (63 Fed. Reg. 16218, April 2, 1998). The spotted frog occurs in the west desert areas of Utah in wetlands with small, clear, and cold-water habitats where shallow water is present with an abundance of herbaceous emergent vegetation (UDWR 1997b). Habitat for this species may be present in some of the wetlands along Skull Valley Road (e.g., Horseshoe Springs). However, the Conservation Agreement for the spotted frog does not list any populations in Skull Valley. Utah Lake (45 to 50 miles to the east) is the closest known site for the spotted frog (UDNR 1998).

Sensitive species. Two State sensitive bats have been mentioned by the State of Utah as potentially occurring in the area of the proposed project; the Townsend's big-eared bat [*Corynorhinus (Plecotus) townsendii*] and the Brazilian free-tailed bat (*Tadarida brasiliensis*) (UDWR 1999). Both of these species rely on caves or abandoned mines for their colonies or their communal roosts (UDWR 1997a, UDWR 1997b). These bats are not expected to use the site. However, the Townsend's big-eared bat has been identified in the Chokeberry Springs area of the Stansbury Mountains, approximately 16 km (10 miles) to the northeast of the proposed PFSF site. While not expected, it is possible that these bats could occasionally feed at the proposed PFSF site, but because there are no abandoned mines or caves in the area, that would be the extent of their activity (PFS/ER 2001).

The desert kangaroo rat (*Dipodomys deserti*) (a BLM sensitive species) and a close relative, the Merriams kangaroo rat (*Dipodomys merriami*), use desert shrub habitats similar to those present in Skull Valley. However, UDWR states that both species are restricted in Utah to only Washington County, in the extreme southwestern part of the State (UDWR 1997b).

The Skull Valley pocket gopher (*Thomomys bottae robustus*) and kit fox (*Vulpes macrotis*) are listed as sensitive by BLM (Table 3.4). The gopher prefers soft loamy soils to dig mounded burrows (Stone & Webster 1998). Habitat for this species is present at the proposed PFSF site, along Skull Valley Road, and along the Skunk Ridge railroad corridor. Skull Valley pocket gophers are very widespread throughout the valley (Pritchett 2001). Surveys in April and May 2001 of the potential project areas found 31 active burrow sites, including four within the construction zone for the PFSF access road and seven within the proposed rail access corridor (Pritchett 2001).

The kit fox is a BLM sensitive species and occurs in Skull Valley (BLM 1998; Burt and Grossenheider 1976). It prefers habitats that are open and contain sandy ground and low desert vegetation (Burt and Grossenheider 1976).The preferred prey species for kit fox are rabbits and desert rodents such as ground squirrels, rats, and mice (Whitaker 1980), which are common on the proposed PFSF site. Habitat is present for this fox along Skull Valley Road, the Skunk Ridge railroad corridor, and on the proposed PFSF site itself. A wildlife survey found no evidence of the kit fox along the Skunk Ridge rail line corridor or at the ITF, but fecal remains believed to be those of a kit fox were observed at Hickman Knolls (PFS/ER 2001).

A State sensitive mammal is the ringtail (*Bassariscus astutus*). The ringtail is not expected at the proposed PFSF site or along the Skunk Ridge Corridor, as it is dependent on having water nearby (UDWR 1997b). The ringtail could use the springs to the north of the project site, along Skull Valley Road.

The white-faced ibis (*Plegadis chihi*) and snowy plover (*Charadrius alexandrius*) are birds listed by BLM as sensitive species. BLM has indicated that these species should be expected to use the Horseshoe Springs wetland area (BLM 1997). Therefore, these birds are not expected to use the site or rail corridor. The State and BLM sensitive long-billed curlew (*Numenius americanus*) is thought to nest in the Horseshoe Springs area and along the proposed Skunk Ridge rail corridor (PFS/ER 2001). This shorebird nests in the upland meadows and rangelands of northern and central Utah valleys and forages in moist meadow wetlands and upland habitats (UDWR 1997a and 1997b).

The sage grouse (*Centrocerus urophasianus*) is a native game species. The sage grouse has declined approximately 50 percent since 1967, and because of this decline, it is listed as a sensitive species by the BLM and the State of Utah (UDWR 1999; UDWR 1997a and 1997b). Sage grouse breeding grounds, called leks, are usually associated with short cover in open areas. Wet meadows are vital for early brood rearing habitat. Use areas have been identified north and northeast of the proposed PFSF site along Skull Valley Road and in the foothills of the Stansbury Mountains. The closest use area to the Reservation appears to be approximately 16 km (10 miles) to the northeast (UDWR 1997a), therefore, the sage grouse is not expected to be present at the site or along the rail corridor.

The Utah milk snake (*Lampropeltris triangulum taylori*) was mentioned as possibly being in the area of the site by UDWR (UDWR 1999). However, it is not expected to use the project site or the Skunk Ridge rail corridor area, because it occurs in wooded mountain areas.

Other species of special concern. Raptors are a group of birds that the State of Utah and BLM consider to be species of interest. Hawks, falcons, owls, and eagles are protected under the Utah State Code. Disturbance that results in the abandonment of a raptor nest is an unlawful take and is in violation of Utah Code 23-13-2 (43). In addition to the species discussed previously (i.e., bald eagle, peregrine falcon, and ferruginous hawk), turkey vulture; golden eagle; swainson's, rough-legged, and red-tailed hawks; prairie falcon; kestrel; northern harrier; and burrowing, short-eared, and great-horned owls are listed as either high interest or sensitive with the State of Utah and BLM. The golden eagle has added protection under the Bald and Golden Eagle Protection Act, as amended. All of these species could use the proposed PFSF site, areas along Skull Valley Road, and the Skunk Ridge railroad corridor for feeding areas. The only exception might be the short-eared owl, which would be more likely to use marsh and wetland areas to the north, such as Horseshoe Springs. Nesting sites have been identified for Swainson's and red-tailed hawks along Skull Valley Road. Burrowing owl nest burrows have been located along the proposed Skunk Ridge railroad corridor. Pairs of northern harriers and a single short-eared owl have been seen along the proposed Skunk Ridge railroad corridor, which indicates they may also breed in these areas (Stone & Webster 1998). Proposed mitigation measures to assure protection of these species are discussed in Section 9.4.2 of this FEIS.

Sandhill cranes (*Grus canadensis*) are a State of Utah conservation concern species that may occur in Skull Valley. Cranes use prairies, grasslands, fields, wetlands, and marsh areas (UDWR 1999; Chandler et al. 1983; National Geographic Society 1983) and are not expected to occur at the proposed PFSF site or along the proposed Skunk Ridge rail corridor.

Other birds mentioned by State and Federal agencies as potentially using the proposed PFSF site and Skull Valley area include the bobolink (*Dolichonyx oryzivoris*), common yellowthroat (*Geothlypis trichas*), Caspian tern (*Sterna caspia*), American white pelican (*Pelecanus erythrorhynchos*), Lewis' woodpecker (*Melanerpes*), and loggerhead shrike. Bobolinks use flooded grasslands and wet meadows in Skull Valley (e.g., wetland areas north of the proposed PFSF site, along Skull Valley Road). Common yellowthroats also use these wetlands (UDWR 1997b; UDWR 1999). Therefore, neither of these birds are expected to use areas associated with the proposed PFSF site, the rail corridor, or ITF. Caspian terns and American white pelicans would not be expected to use the proposed PFSF site or any transportation corridors (i.e., rail corridor or ITF). These birds nest on islands in the Great Salt Lake and then use freshwater wetlands for foraging (UDWR 1997b). The Lewis' woodpecker prefers open wooded areas and is not expected to use areas associated with the project. This woodpecker is a resident of the riparian habitats of the Uinta Basin, over 161 km (100 miles) east of Skull Valley (UDWR 1997b). The loggerhead shrike is a species known to nest in the saline lowlands of Skull Valley. Shrikes have been observed on the proposed PFSF site as well as along the Skunk Ridge corridor, and could be expected to occur along Skull Valley Road (Stone & Webster 1998).

Speckled dace (*Rhinichthys osculus*), mink (*Mustela vison*), and Great Basin spadefoot toad are State protected species (UDWR 1997a). According to UDWR, speckled dace and mink use wetland areas along Skull Valley Road, to the north of the proposed PFSF site and are not expected to use areas associated with the proposed PFSF site. The Great Basin spadefoot toad has been identified to the south of the proposed PFS site and could be present in certain seasonal drainages that occur along the Skunk Ridge railroad corridor (Stone & Webster 1998; UDWR 1997a).

A State-listed high interest snail, swamp lymnaea *(Lymnaea stagnalis),* is known to exist in wetlands south of the proposed PFSF site. The snail could occur in wetlands along Skull Valley Road but is not expected to use areas associated with the proposed PFSF site (UDWR 1997a; Stone & Webster 1998).

3.5 Socioeconomic and Community Resources

This section describes such socioeconomic characteristics and community resources as population, employment, and housing. It discusses the availability of services (such as schooling and housing) in those surrounding communities that would be likely to attract any temporary or permanent work force. The socioeconomic conditions of the Skull Valley Band are discussed first, followed by a discussion of the socioeconomic conditions in areas surrounding the Reservation.

The proposed PFSF site and the alternative site are in the northwest section of the Reservation. The Reservation, itself, consisting of approximately 7,530 ha (18,600 acres), is situated in the east-central portion of Tooele County. The Skull Valley Road travels north-south through the Reservation, connecting to Interstate 80, which travels east into Salt Lake City.

3.5.1 The Reservation

The Reservation is located in a remote area approximately 56 km (35 miles) south of the Great Salt Lake. The Reservation is in a semi-arid valley, and a portion of the Wasatch-Cache National Forest borders the Reservation on the east. Reservation land is suitable for grazing. About 65 ha (160 acres) of Reservation land are irrigable. Stream water is delivered to the irrigable lands through an existing pipeline.

The Skull Valley Band is culturally and economically similar to the Western Shoshone and speaks Shoshone. The Skull Valley Band has an enrollment of approximately 120 members, with about 30 members of the Skull Valley Band residing on the Reservation. The majority of these members are under the age of eighteen. The balance of the enrollment resides in outlying areas within the State of Utah or out-of-state. Some adult members residing on the Reservation are employed off the Reservation in nearby communities working with the agriculture, forestry, and fisheries classes of industry (PFS/RAI1 1999).

The majority of the Skull Valley Band members that do not reside on the Reservation are employed in Salt Lake City, Grantsville, Stockton, Tooele, and Ibapah. These members are employed in various positions including artisans, nurses, and construction workers. Several of the enrolled membership living off the Reservation have expressed interest in returning to the Reservation if jobs and housing were available (PFS/RAI1 1999).

The average household income of the Skull Valley Band members living on the Reservation is approximately $20,000 per year (PFS/RAI1 1999). About 17 individuals living on the Reservation are noted as members of households having income below the national poverty level (includes individuals living on the Reservation who are not Skull Valley Band members, such as spouses) (PFS/RAI1 1999).

The school-age children on the Reservation attend classes at the school located in the Town of Dugway (PFS/ER 2001). Approximately 10 percent of the enrolled membership have 2 or 4-year degrees from post-secondary educational institutions. The Skull Valley Band has an ongoing tuition assistance program that has limited capability due to insufficient financial resources (PFS/RAI1 1999).

Health care is provided by the Indian Health Service Uintah and Ouray Service Unit in Fort Duchesne, 510 km (320 miles) from the Reservation. Hospital care is provided through the Indian Health Service

Contract Health Program in Tooele. The Indian Health Service has not provided data requested to characterize the health status of the Skull Valley Band.

The Skull Valley Band has no natural resources other than the land itself, and has pursued economic development projects that are consistent with the numerous waste processing and testing facilities that surround the Reservation. Until 1995, about 90 percent of their income to fund programs came from the lease of the Tekoi Rocket Testing Facility on the Reservation. This lease has recently expired and has not been renewed.

Through an annual budgeting process, the Skull Valley Band allocates all financial resources for the betterment of their living conditions (PFS/RAI1 1999). Many of the activities conducted on the Reservation, including maintenance and operation of the Pony Express Convenience Store, which sells convenience groceries and gasoline to Skull Valley Band members and passers-by on Skull Valley Road, and the operation of Tribal governance, are currently staffed with volunteers due to the lack of financial resources. Three volunteer staff members, including one Skull Valley Band member from the Reservation, one individual married to a Skull Valley Band member, and one person who is not a member of the Skull Valley Band, operate the store. Income derived from the store is deposited into the Tribal general account (PFS/ER 2001). Tribal government is in the process of developing financial strategies to provide for the long-term financial security and improvement in the standard of living for enrolled Skull Valley Band members from their business ventures (PFS/RAI1 1999).

Utility infrastructure on the Reservation is limited. Included are a community building, storage shed, water shed, water tank, and a small reservoir. The types of utilities available include Skull Valley Band water (three drilled wells), individual septic systems, electricity provided by Utah Power, telephone service, and propane provided by Amerigas (PFS/ER 2001).

The Skull Valley Road passes through the Reservation approximately 2.4 km (1.5 miles) from the proposed PFSF site (see Figure 2.1). Traffic on this roadway is primarily related to local resident travel and travel between Interstate 80 and the Dugway Proving Ground. Average daily traffic on Skull Valley Road past the Reservation in 1995 was approximately 325 vehicles per day (Utah Department of Transportation 1995).

3.5.2 Tooele County and Communities

3.5.2.1 Land Use

The principal land uses in Skull Valley are rangeland for livestock grazing (agriculture) and recreation. For both of these activities, much of the land used for these purposes is administered by the BLM. Much of the remainder of the land is split between the Reservation and private ownership, with some land owned by the State of Utah. The following discussion describes land ownership and land use for the impact area.

Many areas of Tooele County are undeveloped and somewhat isolated. Most land in the County is under the administration of the BLM and the U.S. Department of Defense (including Dugway Proving Ground, the Utah Test and Training Range (UTTR), and Tooele Army Depot and Deseret Chemical Depot), and a significant portion of the county is actively used for hazardous waste incineration and storage (at the USPCI, Aptus, and Envirocare facilities) (see Figure 1.1). The Dugway Proving Ground includes about 340,000 ha (840,000 acres), with its nearest border about 24 km (15 miles) southwest of the proposed PFSF site. It is a U.S. Army multipurpose facility that tests chemical and biological defense systems.

Skull Valley is adjacent to the UTTR which includes 19,000 square miles (about 12 million acres) of restricted airspace in northern Utah. The proposed PFSF site is located within the northern boundary of the Sevier B military operating area (MOA), which is utilized by military aircraft in training and in traveling to and from the UTTR and Hill Air Force Base (see Figure 1.1).

Mineral extraction interests are active near the Great Salt Lake and in the mountainous areas of the county. The military and hazardous waste industries have located in the county from throughout the nation, as have mineral extraction interests (Gillies Stransky Brems Smith Architects 1995).

Table 3.5 shows the percentage of Tooele County that has been farmland since 1982. Although the county is not heavily agricultural (i.e., much of the county is administered by Federal agencies) and the proportion of land dedicated to farming has declined over the last fifteen years, agriculture still plays an important role in the local economy (see Section 3.5.2.3). To put the agricultural character of the county in perspective, approximately 42 percent of U.S. land overall is in farms compared with 6.6 percent in Tooele County (U.S. Dept. of Agriculture 1999).

Table 3.5. Land in farms in Tooele County

	1982	1987	1992	1997
	Hectares (acres)	**Hectares (acres)**	**Hectares (acres)**	**Hectares (acres)**
Total land area	1,799,000 (4,445,400)	1,799,000 (4,445,400)	1,799,000 (4,445,400)	1,799,000 (4,445,400)
Land in farms	204,642 (505,681)	197,255 (487,427)	176,944 (437,238)	117,862 (291,238)
Percent of total land area that is farmland	11.4	11.0	9.8	6.6

Sources: U.S. Bureau of the Census 1992. *1992 Census of Agriculture* and the U.S. Department of Agriculture 1999. *1997 Census of Agriculture*

Land ownership and administration within Skull Valley includes the Reservation, the Dugway Proving Ground (military), Wasatch-Cache National Forest, the BLM, the State of Utah [approximately 10,120 ha (25,000 acres)], and privately owned ranches and residential areas. The privately owned ranches consist of about 28,328 ha (70,000 acres), and the Reservation is approximately 7,530 ha (18,600 acres). Most of the land in Skull Valley is administered by the BLM, which leases much of its land for grazing.

With the exception of the Reservation and other lands under the domain of Federal agencies, land in Skull Valley is controlled by Tooele County zoning. The Tooele County General Plan (Gillies Stransky Brems Smith Architects 1995) defines six planning districts: Tooele Valley, Rush Valley, West Desert, I-80 Corridor, Ibapah-Gold Hill, and Skull Valley.

The Skull Valley planning district stretches from its northeast corner just south of Timpie to the southern border of Tooele County. Within this area, most of the land is zoned as “multi-use.” However, along the Skull Valley Road there are significant land areas zoned as “agricultural” which requires a minimum lot size of 16.2 ha (40 acres). Permitted uses in Multiple Use and Agricultural Districts include agricultural uses, construction of single and two-family homes, recreation facilities and storage of agricultural equipment. The Wasatch-Cache National Forest is a significant part of the Planning District and starts about 8 km (5 miles) to the east of the Skull Valley Road, extending southward for about 32 km (20 miles) and ending just north of Highway 199.

Within an 8-km (5-mile) radius of the proposed PFSF, there are approximately 5,263 ha (13,000 acres) of Reservation land, 3,644 ha (9,000 acres) of privately owned land, and 11,336 ha (28,000 acres) of public land administered by the BLM (PFS/ER 2001). The Skull Valley Band village and two private ranches are within this radius. Two private ranches, on Skull Valley Road, are approximately 4.8 km (3 miles) and 6.4 km (4 miles) northeast of the proposed PFSF (PFS/ER 2001). Cattle grazing on a small part of the Reservation is a future possibility (PFS/RAI1 1999).

The BLM land within the 8 km (5 miles) radius is part of the Skull Valley and South Skull Valley grazing allotments and includes three pastures (West Cedar, Eightmile, and Black Knoll). The southeast corner of the Black Knoll Pasture is within the 8 km (5 miles) radius. Two operators are authorized to graze up to 5,000 sheep and 2,300 cattle within the Skull Valley allotment from November 1 to April 30. Sheep graze in alternate years. Cattle graze following a 3-year cycle: in year one they graze from November 1 to April 30; in year two they graze from November 1 to February 28; and in year three they graze from April 1 to April 30. The potential rail line from Skunk Ridge to the proposed PFSF would cross the Eightmile and Black Knoll Pastures. Portions of two pastures in the South Skull Valley allotment are within the 8 km (5 miles) radius of the site: the east end of the Cochrane Pasture and the north edge of the Post Hollow Pasture. The permit holder for these pastures is authorized to graze a maximum of 700 cattle and 3,800 sheep from November 1 to April 30 in alternating years (PFS/ER 2001).

In summary, the Skull Valley area in general and the area surrounding the proposed PFSF are characterized by open space and are generally undeveloped with mostly limited grazing and agricultural uses. The opportunity for expansion of existing uses in the valley is limited due to the lack of accessible private land in the valley or along the Skull Valley Road corridor. In addition, because of the valley’s limited population, services, and infrastructure, significant future growth in commercial or industrial uses seems unlikely (Gillies Stransky Brems Smith Architects 1995).

3.5.2.2 Population

Aside from the Reservation, which has a residential population of about 30, residential populations in Skull Valley include about 30 households in the unincorporated town of Terra and 11 households in the rest of the valley. Assuming a persons per household value of 2.87 (Governor’s Office of Planning and Budget 1997), this represents a total non-Reservation population of approximately 120 persons within Skull Valley; combining Reservation and non-Reservation populations results in a total of approximately 150 persons within Skull Valley. The households in Terra are located there primarily due to employment at the Dugway Proving Ground and the remaining residences are related to ranching and agricultural activities. The Town of Dugway, located 21 km (13 miles) south of the proposed PFSF, with a population of about 1,800 (PFS/ER 2001), is just outside the Skull Valley Planning District; however, Dugway’s on-site residences and employment are important sources of traffic on Skull Valley Road.

Tooele County's population is approximately 33,351 (1998), and approximately 16,748 people live in its largest city, Tooele (1998). The county's average annual growth rate of approximately 2.9 percent through the 1990s is higher than the State's average of 2.1 percent. By 2020, the population is projected to surpass 59,000. Tooele County has the second largest land area in the State, but a relatively low density of 4.8 people per square mile estimated in 1998 (Governor's Office of Planning and Budget, Demographic and Economic Analysis, http://www.governor.state.ut.us/dea/rankings/county/densitygh.htm), as compared with a density of approximately 25.4 persons per square mile estimated in 1998 for the State as a whole (Governor's Office of Planning and Budget, Demographic and Economic Analysis, http://www.governor.state.ut.us/dea/rankings/county/popgh.htm).

Table 3.6 shows current populations and recent changes in population for Tooele County and incorporated areas within Tooele County. No official population counts are available for the Skull Valley portion of Tooele County itself. Table 3.7 provides additional historical data regarding population in Tooele County. Projections of future population for Tooele County and incorporated areas within Tooele County are provided in Table 3.8.

No transient or institutional populations are present within 8 km (5 miles) of the proposed PFSF. During October 1996, a survey was conducted to identify existing and planned public facilities and institutions within an 8 km (5 miles) radius of the facility. Due to the remoteness and extremely low population density of the area [36 persons within an 8 km (5 miles) radius of the proposed PFSF], no public facilities such as hospitals, prisons, parks or designated recreational areas are located or planned within that radius (PFS/ER 2001).

3.5.2.3 Employment and Economic Resources

This section describes the local economy and presents the relevant unemployment statistics for the area. The nature of the local workforce is also presented in light of the potential need for workers at the proposed PFSF.

Tooele County's 1995 per capita income was approximately $14,800. This is lower than the State average of $18,226. The county's 1996 unemployment rate, at 5.3 percent, was higher than the State's 3.5 percent that same year.

As of 1996, there were approximately 10,650 employees in the Tooele County labor force. As demonstrated in Table 3.9, total employment in Tooele County has remained fairly stable over the last 15 years, as has the unemployment rate.

As demonstrated in Table 3.10, government provides more jobs, by far, than any other source of employment in the county, although the proportion of government jobs to total jobs has declined substantially over the last 15 years. The major employers for Tooele County, as of 1996, were

Table 3.6. Population in Tooele County and incorporated areas

City	1990	1991	1992	1993	1994	1995	1996	1997	1998
Grantsville	4,500	4,633	4,723	4,821	4,920	4,998	5,198	5,304	5,528
Ophir	25	25	25	26	27	29	30	32	34
Rush Valley	339	347	349	352	357	365	367	369	375
Stockton	426	433	438	444	457	460	467	478	497
Tooele (city)	13,887	14,094	14,274	14,454	14,716	14,830	14,996	15,711	16,748
Vernon	181	185	186	190	197	198	199	198	202
Wendover	1,127	1,122	1,124	1,145	1,167	1,178	1,190	1,216	1,258
Balance of Tooele County	6,116	6,225	6,322	6,536	6,919	7,255	7,649	8,157	8,709
Tooele County Total	26,601	27,064	27,441	27,968	28,760	29,313	30,096	31,465	33,351

Source: U.S. Bureau of the Census, *Subcounty Population Estimates, 1990–1998*. Washington, D.C., July 1999.

Table 3.7. Historical population data for Tooele County

Category	1940	1950	1960	1970	1980	1990
Total population (July 1)	9,133	14,636	17,868	21,545	26,033	26,601
Percent change from previous value	N/A	60.3	22.1	20.6	20.8	2.2

Source: U.S. Bureau of the Census, *Population of Counties by Decennial Census: 1900–1990*.

Table 3.8. Population projections for incorporated areas in Tooele County

Area	1999	2000	2001	2002	2003	2010	2020
Grantsville	6,160	6,459	6,771	7,099	7,324	9,144	11,470
Ophir	33	34	34	35	37	42	54
Rush Valley	406	433	461	491	506	652	751
Stockton	543	567	592	618	637	794	991
Tooele (city)	16,907	17,386	17,879	18,387	18,971	20,452	26,252
Vernon	206	220	234	249	257	294	372
Wendover	1,378	1,363	1,348	1,333	1,375	1,302	1,922
Balance of Tooele County	8,981	8,819	8,658	8,551	8,823	13,794	17,866
Total	34,615	35,280	35,977	36,762	37,931	46,474	59,678

Source: Governor's Office of Planning and Budget—Demographic and Economic Analysis Section, UPED Model System, 1997 Baseline Projections (12/17/96)

Table 3.9. Employment and income for residents of Tooele County

Category	1980	1985	1990	1995	1996
Labor force	11,489	11,697	12,275	11,040	11,243
Employed	10,838	10,991	11,667	10,418	10,651
Unemployed	651	706	608	622	592
Unemployment rate (percent)	5.7	6	5	5.6	5.3
Per capita income	$7,968	$10,966	$13,378	$14,772	N/A

Source: Governor's Office of Planning and Budget, Demographic and Economic Analysis, Historical data: Tooele County (http://www.qget.state.ut.us/county/scripts/County)

Table 3.10. Employment by economic sector in Tooele County

Economic sector	1980	1985	1990	1995	1996
Manufacturing	1,095	1,173	1,008	1,050	1,183
Mining	885	322	229	213	216
Construction	269	322	391	605	669
Transportation, communications and public utilities	247	218	256	1,301	1,694
Trade	962	1,204	1,335	1,599	1,715
Finance, insurance and real estate	167	157	134	171	192
Services	749	996	1,265	1,431	1,572
Government	5,752	6,224	5,939	3,458	3,279
Non-farm proprietors	1,001	1,345	1,505	1,895	2,020
Total employment	11,520	12,355	12,434	12,091	12,918

Source: Governor's Office of Planning and Budget—Demographic and Economic Analysis Section.
UPED Model System 1997 Baseline Projections (12/17/96). The last year of historical data is 1995 for employment and 1996 for population.

Agriculture in Tooele County in 1997 occurred on 332 farms and covered approximately 117,862 ha (291,238 acres) of land. Important commodities are wheat, barley, hay, and cattle. As discussed in Section 3.5.2.1, much of the land used for grazing purposes derives from allotments from the BLM. Table 3.11 provides information related to agricultural activity in Tooele County.

In summary, the economy of Tooele County consists of several ?mini" economies. The more remote, rural areas are resource-based economies that rely on agriculture, ranching, and mineral extraction, while the more developed and populous Tooele Valley is more multi-dimensional with active roles played by manufacturing, retail and wholesale trade, and government sectors (PFS/ER 2001).

Natural resources, particularly the lack of water resources, will always serve as a limitation to potential growth in the more remote areas of the county (Gillies Stransky Brems Smith Architects 1995).

Table 3.11. Agricultural activity in Tooele County

	1982	1987	1992	1997
Farms (number)	304	299	300	332
Average size of farm (acres)[a]	1,663	1,630	1,457	879
Irrigated land (acres)	21,570	18,972	16,479	18,944
Cattle and calves inventory (number)	27,277	24,350	18,652	20,051
Sheep and lambs inventory (number)	20,414	30,755	21,054	7,908
Crops in production:				
Corn (tons, green)	2,530	4,098	3,879	2,830
Wheat (bushels)	52,252	141,221	35,180	50,675
Barley (bushels)	167,977	128,324	90,806	90,589
Oats (bushels)	11,739	13,261	5,765	4,021
Hay (including alfalfa) (tons, dry)	50,832	33,230	33,812	47,818

[a]1 acre - 0.40469 ha.
Source: U.S. Department of Agriculture, National Agricultural Statistics Service, *1997 Census of Agriculture*.

3.5.2.4 Community Resources

Information on community resources (including utilities, public services, housing, schools, and transportation) in Tooele County is presented and discussed in this section. Details related to the Reservation are presented in Section 3.5.1

Utilities. Utility infrastructure in Skull Valley is very limited. In the more populated parts of Tooele County (e.g., Tooele Valley, Rush Valley), there is an established infrastructure that provides potable water, sanitary sewer, natural gas, and electrical service. The entire county is served by electrical power and telephone service; natural gas and cable television are only available in the Tooele Valley area where the population density is higher (PFS/ER 2001).

Drinking water in Tooele County originates from well or spring sources. Most of the incorporated areas and military installations provide central water systems and operate well systems, providing water for potable uses as well as industrial use and fire protection. In the rural areas, individual wells provide potable water for farm and ranch operations and homes. Water use in Skull Valley itself is limited to servicing human consumption needs, limited irrigation for the growth of cattle feedstock crops along Skull Valley Road, and drinking water for the livestock itself over the grazing areas (PFS/RAI1 1999).

The only centralized wastewater systems serving the county are located in Tooele, Grantsville, Lake Point, Stansbury Park, Wendover, and at the military facilities at Tooele Army Depot and Dugway Proving Ground. The rest of the county is served by individual septic tank systems. The septic tank systems have worked relatively well, but in areas of shallow groundwater some failures have occurred (PFS/ER 2001).

Electrical power is provided to virtually the entire county. Service is limited in more rural areas and is generally located along public roads. Power lines cross through the county to serve other areas. Telephone service is also available throughout the county, with U.S. West providing service to the eastern, more densely populated party of the county and smaller systems serving more rural areas (PFS/ER 2001).

Natural gas service is provided to the eastern part of the county. In other areas, service is not provided due to the economics required to extend service lines to customers (PFS/ER 2001). However, propane is provided to other areas by Amerigas.

The management and disposal of solid waste has traditionally been provided by the county to all residents. Historically, the county has operated a solid waste landfill where all collected wastes have been deposited. The county has recently closed its old facilities and has developed a new facility for recycling, composting, and conditioning waste that complies with all current regulations (PFS/ER 2001).

Public health and safety. The Tooele County Fire District is a volunteer fire department that provides service in an area extending from Stockton to the Great Salt Lake and from the eastern county line westward to Interstate 80 mile marker 45. When necessary, the department responds to emergencies throughout the remainder of the county (PFS/ER 2001).

Health and emergency services, including the Tooele Regional Medical Center, Home Health and Nursing Home operations, and the Tooele Valley Ambulance Service, are located in Tooele Valley in the incorporated areas of Grantsville, Tooele, and Vernon. The medical center offers surgery, emergency, laboratory, and special medical care and testing (PFS/ER 2001). More extensive health care services are offered in Salt Lake City.

The Tooele County Sheriff’s Department responds to accidents and crime throughout the county, while city police departments serve the communities of Tooele, Grantsville, Stockton, and Wendover (PFS/ER 2001).

Housing. Key housing data for Tooele County and incorporated areas in the impact area are provided in Table 3.12. This information, which comes from the 1990 decennial census, is the latest complete set available for the jurisdictions under study. The proportion of housing units occupied by renters varied from a low of approximately one-fifteenth in the towns of Cedar Fort and Rush Valley to 100 percent in Dugway and just over one-half in Wendover. If one discounts Dugway and Wendover as sources of potential housing for the proposed action (because housing in Dugway is restricted to employees of Dugway Proving Ground and Wendover is relatively far from the proposed site), the incorporated areas with the greatest absolute number and proportion of renter-occupied housing units are Grantsville and Tooele City. The median value of an owner-occupied unit was lowest in Stockton, and the median rent was lowest in Ophir. The median value of a home was highest in Rush Valley, and, discounting Dugway (see above), the rent was the highest in Tooele. In all of Tooele County, there were 147 vacant units for sale and 413 units for rent in 1990. Table 3.13 shows substantial growth in residential development in recent years that may indicate greater housing capacity than indicated by the information displayed in Table 3.12.

Education. The Tooele County School District offers education throughout the county. It includes 19 public schools (including schools for students of employees at Tooele Army Depot and Dugway Proving Ground) as well as an adult education center. As of October 1998, there were approximately 8,170 students enrolled in district schools. Table 3.14 provides information regarding the enrollment at each of the district's schools. The student/teacher ratios for schools in the Tooele County School District average approximately 22.6, with the lowest ratios being found in grades seven and eight (19.6 students per teacher) and the highest being found in sixth grade (25 students per teacher) (Tooele County School District 1999).

During 1998–99, the Tooele County School District added over 76,000 square feet of new classroom space, with a new elementary school in Wendover and twenty new classrooms at East Elementary School and Stansbury Park Elementary School, and a multi-purpose room at Harris Elementary School. These projects were completed as a result of a $10 million bond issue approved by voters in the district in 1996. The Tooele School District projects an increase of more than 40 percent new growth in the next 10 years and, based on this new growth, substantial additional capacity will be required, including a new elementary school in Grantsville, additional elementary schools in Tooele, Stansbury and Erda, an additional middle school and high school in Tooele, Stansbury, and Erda, and additions to the Grantsville high school and middle school (Tooele County School District 1999).

Table 3.12. 1990 housing data for Tooele County and incorporated areas

Location	Number of occupied housing units	Percent of units occupied by owner	Percent of units occupied by renter	Number of vacant housing units	Number of vacant units for sale	Number of vacant units for rent	Median value of owner-occupied unit ($)	Monthly median rent ($)
Grantsville	1,376	77.9	22.1	96	18	26	57,600	238
Ophir	13	69.2	30.8	17	0	0	55,000	99
Rush Valley	112	92.9	7.1	25	4	1	61,700	192
Stockton	133	87.2	12.8	15	3	2	43,300	225
Tooele	4,842	74.5	25.5	348	102	113	59,800	289
Vernon	57	87.7	12.3	14	0	2	52,900	213
Wendover	294	45.2	54.8	54	4	43	55,000	246
Tooele County	8,581	70.2	29.8	929	147	413	60,400	292
Cedar Fort	77	93.5	6.5	7	1	1	58,200	175
Dugway	466	0.0	100.0	164	0	163	NA	366

Source: U.S. Bureau of the Census 1991

Table 3.13. Building permits in Tooele County

Category	1980	1985	1990	1995	1996	1997	1998
Residential building permits	107	126	74	271	323	1,013	1,012

Source: Governor's Office of Planning and Budget, Demographic and Economic Analysis, Historical data: Tooele County (http://www.qget.state.ut.us/county/scripts/County).

Table 3.14. Educational resources in the Tooele County School District (Fall 1997)[a]

School	Location	Grades	Number of students
Kindergarten and elementary schools			
Anna Smith Elementary School	Wendover	K–6	264
Dugway Elementary School	Dugway	K–6	154
East Elementary School	Tooele City	K–6	585
Grantsville Elementary School	Grantsville	K–5	758
Ibapah Elementary School	Ibapah	K–6	25
Northlake Elementary School	Tooele City	K–6	755
Stansbury Park Elementary School	Stansbury Park	K–6	673
Sterling R. Harris Elementary School	Tooele City	K–6	527
Vernon Elementary School	Vernon	K–6	29
West Elementary School	Tooele City	K–6	604
Middle and junior high schools			
Grantsville Middle School	Grantsville	6–8	527
Tooele Junior High School	Tooele City	7–8	729
Ibapah Middle School	Ibapah	7–8	8
High schools			
Dugway Junior-Senior High School	Dugway	7–12	151
Grantsville High School	Grantsville	9–12	800
Tooele High School	Tooele City	9–12	1,505
Tooele Valley High Alternative School (home study)	Tooele Army Depot	10–12	103
Wendover Junior-Senior High School	Wendover	7–12	187
Oquirrh Hills School	Tooele City	ungraded	4

[a]There were also 350 students at the Tooele Adult Education Center and 77 students in preschool at Harris Elementary, Grantsville Elementary, and the Oquirrh Hills Early Learning Center enrolled as of October 1, 1998.

Source: Tooele County School District 1999.

Transportation. The Skull Valley Road passes through the Reservation approximately 2.4 km (1.5 miles) from the proposed PFSF (see Figure 2.1). Traffic on this roadway is primarily related to local resident travel and travel between Interstate 80 and the Dugway Proving Ground. Table 3.15 provides information related to traffic on roads potentially affected by the proposed action. Table 3.16 provides information depicting monthly and daily variation in traffic on Interstate 80.

Table 3.15. Traffic on highways potentially affected by the proposed action

Road[a]	Road segment	Road segment length in miles (km)	1995 average daily traffic	1997 average daily traffic[b]
Skull Valley Road	Junction SR 199 at Dugway Proving Ground to Iosepa	21.3 (34.3)	325	NA
	Iosepa to Interstate 80 at Timpie Waterfowl Area	15.3 (24.8)	565	NA
Interstate 80	Lakeside interchange to Delle interchange [11.2 km (7 miles) west of Skull Valley Road]	6.9 (11.1)	7,790	NA
	Delle interchange to Rowley interchange (at Skull Valley Road)	7.0 (11.3)	8,600	8,000
	Rowley interchange to Stansbury interchange [11.2 km (7 miles) east of Skull Valley Road]	5.1 (8.1)	8,760	8,495
	Stansbury interchange to Burmester interchange	10.3 (17.1)	8,900	9,014
	Burmester interchange to Tooele interchange	2.6 (4.2)	25,335	NA
SR 36	North incorporated limits of Vernon to junction SR 199	3.7 (6.3)	1,655	1,715
	Junction SR 199 to junction SR 73	4.9 (7.9)	3,315	NA
	Junction SR 73 to north incorporated limits of Stockton	4.0 (6.4)	4,080	NA
	North incorporated limits of Stockton to junction local road to Tooele Army Depot	1.1 (1.8)	9,160	NA
	Junction local road to Tooele Army Depot to south incorporated limits and south urban boundary of Tooele	1.3 (2.1)	8,745	NA

Table 3.15. Continued

Road[a]	Road segment	Road segment length in miles (km)	1995 average daily traffic	1997 average daily traffic[b]
	South incorporated limits and south urban boundary of Tooele to 300 South in Tooele	0.5 (0.8)	15,885	NA
	300 South in Tooele to Vine Street in Tooele	0.3 (0.5)	23,335	NA
	Vine Street in Tooele to 100 North SR 112	0.3 (0.5)	21,725	NA
	100 North SR 112 to north incorporated limits of Tooele	2.3 (3.7)	11,295	NA
	North incorporated limits of Tooele to north urban boundary of Tooele	5.8 (9.3)	10,155	NA
	North urban boundary of Tooele to junction SR 138 Mills Junction	2.7 (4.3)	10,950	NA
	Junction SR 138 Mills Junction to truck stop service center Interstate 80	0.6 (1.0)	12,300	NA
SR 138	Interstate 80 to east incorporated limits of Grantsville	6.8 (10.9)	5,805	1,260
	East incorporated limits of Grantsville to west incorporated limits of Tooele and junction with SR 36	1.7 (2.7)	6,810	6,245
SR 199	Dugway Proving Ground East Gate to junction with Skull Valley Road	8.1 (13.0)	675	725
	Junction with Skull Valley Road to Terra	9.3 (15.0)	850	915
	Terra to local road	4.1 (6.6)	890	NA
	Local road to junction SR 36	0.7 (1.1)	1,355	NA

[a]SR = State road
[b]NA = Not available

Source: Utah Department of Transportation, *1995 Traffic on Utah Highways* (traffic.pdf) (obtained from: http://www.sr.ex.state.ut.us/html/site_documents.htm), and PFS/RAI1 1999.

Table 3.16. Monthly and daily traffic on I-80, east of Delle Interchange

Month	Average per day Sunday through Saturday	Average per day Monday through Friday	Month daily average as percent of the year daily average
	I-80, east of Delle Interchange		
January	5,880	5,186	75.5
February	6,566	5,658	84.3
March	7,035	6,307	90.3
April	7,513	6,573	96.5
May	7,996	7,345	102.7
June	9,012	8,430	115.7
July	9,823	9,139	126.1
August	9,686	9,043	124.4
September	8,447	7,746	108.4
October	8,502	7,761	109.2
November	6,654	6,398	85.4
December	6,250	6,106	80.2
Daily average for year	7,789	7,156	Not available

Source: Utah Department of Transportation, *1995 Traffic on Utah Highways* (traffic.pdf).

3.6 Cultural Resources

3.6.1 Cultural Background

The region of the proposed action is rich in prehistoric and historic period Native American and historic period Euro-American cultural resources. Human occupation and use of this part of Utah can be placed into several sequential chronological periods, summarized in Table 3.17. Basic references for the historic period background of Skull Valley and environs include Bluth (1978), Blanthorn (1998), and various chapters in Miller (1990); other references that deal more directly with specific cultural resource projects or individual cultural properties are cited in the following sections.

3.6.2 Archaeological, Native American, and Historic Properties

3.6.2.1 Archaeological Properties

A number of previous archaeological field surveys have been completed in the Skull Valley area. All of these efforts have been completed in response to Federal agency projects requiring cultural resource clearances, such as BLM land exchange parcels (e.g., Christensen 1989; Melton 1998a), fire rehabilitation projects (Melton 1998b), or private projects that require the use of Federal or State

Table 3.17. Generalized cultural sequence for the region including Skull Valley

Cultural period	General timeframe	General characteristics
Paleoindian	10,000–7,000 B.C.	Marked by the presence of large, fluted projectile points, often associated with late Pleistocene/early Holocene beaches. Economic reliance on larger game animals, with exploitation of other resources including marshes and lacustrine areas.
Archaic	7,000 B.C.–A.D. 400	Shift in economic focus toward a greater dependence on seeds and plant foods. Settlement and subsistence patterns characterized by exploitation and movement over several ecological zones.
Late Prehistoric/ Fremont	A.D. 400–1300	Marked by a change in subsistence to horticulture, with increased reliance on smaller game animals, semisedentary or sedentary villages, and changes in material culture, including basketry, pottery, and milling implements. Five regional Fremont variants are recognized in the eastern Great Basin; Skull Valley is near the boundary of two: the Great Salt Lake Fremont to the north and the Sevier Fremont to the south.
Protohistoric/Numic	A.D. 1300–Contact[a] with European people	The expansion of the Numic-speaking peoples into the region and the disappearance of the Fremont groups characterize this period. Economic and settlement patterns based on seasonal exploitation of plant and animal resources over a culturally defined territory.
Euro-American	About 1820–present	Initial contact by explorers and surveyors in the early 1800s, followed by emigrants using several trails through Utah, and eventually Mormon colonization and settlement of the region. Euro-American presence in Skull Valley marked by transportation routes and sparsely populated ranching activities.
Historic Native American	Contact[a] with European people–present	In historic times, the general area was homeland to several Western Shoshone Gosiute[b] groups who occupied Tooele, Rush, Skull, and Deep Creek Valleys. 1863 Treaty between Gosiutes and U.S. eventually led to establishment of Reservations at Deep Creek and Skull Valley.

[a]"Contact"—means when the Native Americans were contacted by the European Advance (traders, advancing homestead).

[b]"Gosiute" is a historical spelling of the modern-day "Goshute."

lands. Examples of the latter projects that have occurred in Skull Valley include proposed utility corridors, including power line (Nielson 1992; Nielson and Southworth 1992), fiber optic (Billat et al. 1986), road (Talbot 1989), and pipeline (Senulis 1987) rights-of-way and seismic exploration lines (Birnie and Newsome 2000). In addition to the recording of archaeological properties, several of these projects also recorded historic period properties. Historic sites are discussed in Section 3.6.2.3.

Although few of these inventories encroach on the proposed PFSF project area, the potential does exist for prehistoric sites to occur in Skull Valley, since several sites have been previously identified. Because of the location of many of these past cultural resources projects in the eastern side of the valley, either all or sections of the Skull Valley Road have been inspected on three different occasions. Most of these occur at the springs along the eastern boundary of the distinctive mud flats, in the center of the northern portion of the valley (e.g., Burnt, Muskrat, Horseshoe and Kanaka; see Figure 3.8), or in the vicinity of the higher, more sheltered locations, such as around Delle, Lone Rock and Round Knoll. Most of these archaeological properties are comprised of former campsites with associated artifact scatters.

The major archaeological survey work on the floor of Skull Valley was conducted by the BLM as part of the Dan Freed land exchange that totaled nearly 8,400 acres and is situated north of the Reservation. Cultural resource surveys located 37 prehistoric archaeological sites in these parcels (Christensen 1989), most of which are classified as small scatters of lithic artifacts. Some larger campsites were located, along with three rockshelters and a cave that had been occupied in prehistoric times. While none of these archaeological properties is located in the proposed PFSF project area, the results are indicative of the potential for archaeological resources in the valley. One of the BLM sites, 42TO504, an extensive campsite locality with a surface scatter of stone and ceramic artifacts, was excavated (Smith 1994). This archaeological site lies about 7 miles due north of the preferred site for the proposed PFSF (Site A, see Figures 1.3 and 2.1) on a long low ridge (a linear bar) adjacent to an old playa. Analyses of the materials revealed that the site was probably associated with marsh resources, available at a time when the playa held water. Radiocarbon dates, the ceramics, and some corn remains combine to indicate that occupation of the site dated to the early-mid Fremont time period.

Cultural resources literature searches and field inventories have been completed for the Skull Valley alternative project features. Bright and Schroedl (1998) conducted a Class I (literature and site file coverage) inventory for the proposed ITF just west of Timpie, and the railroad corridor that runs from Skunk Ridge south along the western perimeter of the valley to the Reservation. Along the proposed rail line, the study area included a one-half mile-wide corridor, centered on the proposed alignment. No known prehistoric archaeological properties were identified at either of these project areas, although only a small fraction of the areas under review had received intensive field survey.

In May and June of 1999 and June 2000, cultural resource Class III (intensive field survey) studies were conducted at four project areas: (1) the ITF location, comprising about 40 acres about 1.8 miles west of Timpie Junction; (2) the Skunk Ridge transportation corridor from Interstate 80 southward to the Reservation (about 2,300 acres); (3) the proposed PFSF area (Sites A and B) and the site access road (about 1,000 acres) on the Reservation; and (4) an exploratory trench (about 6 acres), located along the northern base of Hickman Knolls on the Reservation (Birnie and Newsome 2000). The results of this survey confirmed that historic resources are present in the project area and resulted in the discovery and documentation of 12 sites, 16 isolated historic features, and 70 isolated artifacts or small, isolated artifact clusters. Of the 12 sites, 8 are considered eligible for inclusion in the *National Register* including the Hasting Cutoff (site 42TO709) which is part of the California National Historic Trail; U.S. Route 40 (site 42TO1409); the “New” Victory Highway (site 42TO1410); an old alignment of the Victory Highway (site 42TO1411); a late nineteenth- and early twentieth-century telegraph line (site 42TO1412); the Western Pacific Railroad (site 42TO1413); a segment of the Deep Creek Road, which may contain portions of the Beckwith Trail (site 42TO1416); and the Sulphur Spring or Eight-Mile Spring Road (site 42TO1417), which is part of the California National Historic Trail.

Only one other archaeological survey has been completed on the Reservation itself. In 1995, Talbot (1995) surveyed a 40-acre parcel located about 1 mile northeast of the Tribal village for a proposed reservoir. In addition to the ground coverage, archaeological monitoring was completed during digging of several geological drill and backhoe test trenches. No cultural resources were observed during this project. Just outside the Reservation boundary, about one-half mile west of Sites A and B, BLM archaeologists have completed cultural resources survey of over 2500 acres in a rehabilitation project following the 1998 Tekoi Fire (Melton 1998). No archaeological properties were encountered during this fieldwork.

3.6.2.2 Native American Properties

The Skull Valley and adjacent areas have historically been the homelands of the Gosiute (note “Gosiute” is a historical spelling of the modern-day “Goshute”) People, a regional variant of the Great Basin Shoshone culture area (Malouf 1974; Steward 1938; Thomas, Pendleton and Cappannari 1986). Although the Gosiute peoples today occupy two Reservations—the one in Skull Valley and another to the west in Deep Creek—the entire Skull Valley falls within the original exclusively used and occupied Gosiute territory, as determined through litigation before the Indian Claims Commission (Indian Claims Commission, Docket 326, see Horr 1974). For the Reservation, Crum (1987) and Allen and Warner (1971) contain good histories of its historical development.

Early anthropological investigations among the Gosiute reveal the Indians’ extensive familiarity with Skull Valley and the resources contained therein. Gathering information from a Skull Valley Gosiute of 76 years of age in the 1930s, who in turn relied on his wife’s grandfather for information, Steward (1938, 1943) compiled much data, including listing and mapping of known historic villages in the valley. The former village locations include:

- A cave on the northern end of the Stansbury Mountains, near Timpie
- Haiyacawiyep, a winter village near the town site of Iosepa
- *Iowiba*, a winter village in the mountains, just east of the Reservation
- *Tiava*, another winter village on the present Reservation along Hickman Creek
- *Suhudaosa,* a winter village and dance site, located in the vicinity of the Orr Ranch, just south of the Reservation

Steward also notes that the area just south of Delle was the location of antelope drives, and that communal rabbit drives in Skull Valley were an important source of food. The Hickman Creek area where Steward (1938) documented the Goshute village of *Tiava* in the 1930s was also shown to be the location of a Native American settlement in the summer of 1871 (GLO Map 1871).

Ralph Chamberlin, another early 1900s scientist, collected a considerable amount of information from the Gosiute People, including plant names and uses (Chamberlin 1911), place names (Chamberlin 1913), and animal names (Chamberlin 1908). In Skull Valley, Chamberlin provides Gosiute names for many of the springs and creeks, along with other named places. Chamberlin gives Gosiute names and uses for several hundred plants and plant parts that are available throughout the Gosiute territory.

Within the proposed PFSF project area, no traditional cultural properties or usage of culturally important natural resources have been documented. Additionally, during the Section 106 consultation process with regional Federally Recognized Indian Tribes and other organizations, no traditional cultural properties were identified within the project area (see Section 1.5.5). According to Skull Valley Band responses on this topic, the same is generally true for Skull Valley as a whole (PFS/RAI1 1999). Traditional plants of value to the Skull Valley Band, such as sage and cedar, are sparse in the project area due to a lack of surface water, and are considered inferior to the same plants growing in the Stansbury Mountains east of the Reservation, and in the adjacent Tooele Valley. There are no known uses of traditional plants by other Federally Recognized Indian Tribes within Skull Valley.

3.6.2.3 Historic Properties

As a result of Euro-American encroachment into Skull Valley over the past 150 years, there are a number of historic properties throughout the valley, many of which have been formally recorded as cultural resources. The historic properties can be discussed in four broad categories: (1) transportation (trails, roads, and railroad related) sites; (2) communication (telegraph and telephone); (3) settlements; and (4) ranches and other sites.

Transportation. Several mid-19th century historic trails either traversed Skull Valley, or intersected the northern part of the valley as travelers skirted the southern boundary of the Great Salt Lake, all funneled through the Timpie area (DeLafosse 1994; 1998; Kelly 1996; Miller 1958). These are listed as follows:

- Jedediah S. Smith (1826–27)—crossed north to south through the western part of Skull Valley on his way to California
- John W. Gunnison and E. G. Beckwith (1853–54)—crossed from north to south along the western edge of the valley, crossing the Cedar Mountains at Beckwith Pass
- John C. Fremont (1845) and Howard Stansbury (1849–50)—both passed along the south part of the Great Salt Lake, through the northern part of Skull Valley
- Hastings Cutoff (1846–50)—opened by Lansford Hastings following the Fremont survey, this was Utah’s first significant emigrant trail and was used for a five-year period, including the well-documented and ill-fated Donner-Reed Party in 1846. Leaving the Timpie vicinity, this trail passed southward along the east part of Skull Valley, paralleling the Skull Valley Road of today and passing Burnt, Muskrat, and Horseshoe Springs, to the location of the future town site of Iosepa and later the Deseret Ranch. A little to the south of this location the trail turned northwest across the valley and skirted the worst of the mudflats extending southward from the Great Salt Lake (This stretch is known today as Hastings Road). Reaching the west side of Skull Valley at Redlum Spring, the trail went through Hastings Pass across the Cedar Mountains.

In 1851, the Overland Mail stage road was established through the southern part of Skull Valley, diverting much of the transcontinental traffic away from the project area (Fike and Headley 1979). A network of roads connecting the Hastings Cutoff in Skull Valley with the stage road was in place by 1871 and possibly much earlier (GLO Map 1971). A network of secondary roads serving local ranch traffic and possibly some long distance travel was established across northern Skull Valley by 1907 (GLO Map 1907).

In the early 1900s, the advent of automobile traffic created another travel opportunity through Skull Valley. In 1913 the Lincoln Highway Association established a highway from New York City to San Francisco (Hokanson 1988). West of Salt Lake City, the original route of this highway passed through Grantsville, turned south at Timpie and passed through Skull Valley along the current Skull Valley

Road alignment (Knowlton n.d.; Lincoln Highway Association-Utah Chapter n.d.). However, in 1919 a road was cut through the Stansbury Mountains, and the route was changed to go through Tooele, over the pass, and across the southern part of Skull Valley. Several past cultural resources inventories have been conducted along much or part of the Skull Valley Road. These inventories have recorded some prehistoric archaeological sites along the corridor, particularly in the section between Timpie and Iosepa. The Lincoln Highway itself has received little attention as a historic property. BLM archaeologists recorded a 1.6-km (1-mile) section of the road lying south of the Reservation as 42TO1077 (Melton 1998a).

Meanwhile, across northern Skull Valley, an automobile road was established running west from Timpie, following the route of the Western Pacific Railroad. It later was designated the Victory Highway, becoming a competing transcontinental highway. The Victory Highway was realigned and upgraded in 1926 (Petersen 1999).

The Lincoln-Victory Highway era came to an end with the construction of U.S. Highway 40, also following the railroad across northern Skull Valley. U.S. 40 brought in the era of hard surfaced crowned highway transportation. The highway was slightly realigned at least once before being replaced by the modern Interstate 80.

The Western Pacific Railway Company initially completed the present Union Pacific rail line that crosses the northern part of Skull Valley in 1906-07. Recent cultural resources inventories of utility corridors that parallel the railroad have recorded several historic sites (Billat et al. 1986; Nielson 1992). These sites, along with their *National Register* evaluations, include:

- Timpie Railroad Siding (42TO453)—evaluated as being potentially eligible for the *National Register*
- Historic buildings just north of Delle (42TO733)—not eligible
- Low Railroad Siding (42TO4550)— potentially eligible

Communication. The southern end of Skull Valley, along the Overland Stage Road, was the route of early communication endeavors including the Pony Express from 1860–1861 and the transcontinental telegraph from 1861–1869 (Fike and Headley 1979). Later, Western Union telegraph lines were established along both sides of the Western Pacific across northern Skull Valley (GLO Map 1915). Early telephone lines followed the same corridor.

Settlements. Aside from the village on the Reservation, the only permanent settlement to have located in Skull Valley is the town of Iosepa (1889–1917), a settlement of Hawaiian immigrants who had come to the Salt Lake City area following their conversion to the Mormon Church (Atkin 1958; Gregory 1948). In 1917, nearly all of the inhabitants returned to their native land, and the town site became a private ranching company's headquarters, first known as the Deseret Livestock Company and today as the Skull Valley Ranch Company. Skull Valley Road passes through the current ranch, and along the west boundary of the former town site.

The town site was formally recorded as an historic property in 1989 (Talbot 1989) under the site number 42TO540 and evaluated as being eligible for listing in the *National Register*. Three to five structures exist at the site which may date to the original town (two may have been constructed on earlier foundations in the 1930s). Each of these structures has been recorded separately in the Utah SHPO file system. The Iosepa Cemetery (Poulsea n.d.) was nominated and listed on the *National Register* in 1970. In 1987, the BLM completed an Environmental Assessment to allow the Iosepa

Historical Association a Recreation and Public Purposes Act lease that would allow public access and maintenance activities on the part of the cemetery that lies on public lands (BLM 1987).

Ranches and other sites. A number of historic ranches, active and abandoned, lie along Skull Valley Road. According to the 1871 GLO Map, at least four of these ranches were in place at that time. To date, none of these has been recorded as historic properties nor evaluated for *National Register* eligibility. One historic smelter site (42TO236) has been recorded in the northern part of Skull Valley.

3.6.3 Indian Trust Assets

Federally Recognized Indian Tribes are domestic dependent nations, and the Federal government acts as a trustee for those tribes. As a part of its guardian role, the Federal government is obligated to protect tribal interests, a duty that is referred to as the trust responsibility. This trust doctrine is defined through treaties, laws, executive orders, judicial decisions, and agreements.

Tribal trust resources are held by the Federal government in trust through treaties, statutes, judicial decisions, and executive orders. Such resources include money, land, natural resources either on or off Indian lands and other assets, retained by, or reserved by or for Indian tribes

The Department of the Interior Manual at 303 DM 2 (formerly Secretarial Order 3175) establishes the policies, responsibilities, and procedures for government-to-government consultation and legal obligations of the Federal government with Federally Recognized Indian Tribes and tribal members for the identification, conservation, and protection of American Indian and Alaska Native trust resources, trust assets, or tribal health and safety to ensure the fulfillment of the Federal Indian trust responsibility.

3.7 Background Radiological Characteristics

This section presents the background radiological characteristics of the proposed site. Background radiation is created by sources such as cosmic rays; radioactivity naturally present in soil, rocks, and the human body; and airborne radionuclides of natural origin (e.g., radon). Radioactivity still remaining in the environment as a result of the atmospheric testing of nuclear weapons also contributes to the background radiation level, although in very small amounts. Table 3.18 lists the average radiation dose to a member of the U.S. population from naturally occurring and artificial radiation sources. A discussion of radiation dose assessment terminology is presented in the dialogue box below.

A portion of the background radiological characteristics of the proposed PFSF site were determined from a survey of area gamma radiation levels (i.e., cosmic plus terrestrial components of Table 3.18) and samples of the surface soils (PFS/ER 2001). The area gamma measurements were obtained from thermoluminescent dosimeters (TLDs). Two of these dosimeters are located on the proposed PFSF meteorological tower and one is on the exterior of the Pony Express convenience store. The tower and the store are both located on Skull Valley Road, about 5 km (3 miles) southeast of the proposed PFSF site. During the period from December 1996, through January 2000, the average exposure rate measured by the dosimeters (cosmic and terrestrial components) was equivalent to 0.84 mSv/yr (84 mrem/yr) which is approximately 1.5 times the national average.

Table 3.18. Average annual effective dose equivalent of ionizing radiation to a member of the U.S. population

	Effective dose equivalent	
Source of radiation	**mSv (mrem)**	**Percent**
Natural		
Radon[a]	2 (200)	55
Cosmic	0.27 (27)	8
Terrestrial	0.28 (28)	8
Internal	0.39 (39)	11
Total natural[b]	***3 (300)***	***82***
Artificial		
Medical		
X-Ray Diagnosis	0.39 (39)	11
Nuclear Medicine	0.14 (14)	4
Consumer Products	0.1 (10)	3
Other		
Occupational	less than 0.01 (less than 1)	less than 0.03
Nuclear Fuel Cycle	less than 0.01 (less than 1)	less than 0.03
Fallout	less than 0.01 (less than 1)	less than 0.03
Miscellaneous[c]	less than 0.01 (less than 1)	less than 0.03
Total artificial[b]	***0.63 (63)***	***18***
Total natural and artificial[b]	***3.6 (360)***	***100***

[a]Dose equivalent to bronchi from radon daughter products.
[b]Totals have been rounded and may not be numerically identical to the sum of the dose values shown.
[c]From Department of Energy facilities, smelters, transportation, etc.

Source: NCRP 1987.

RADIATION DOSE ASSESSMENT TERMINOLOGY

Ionizing radiation: Electromagnetic waves or particles that are energetic enough to cause the production of ions upon interacting with matter.

Gamma radiation: High-energy, short wavelength electromagnetic radiation (packet of energy) emitted from the nucleus of an atom. Gamma rays are similar to X-rays but have a higher energy.

Maximally exposed individual (MEI): A hypothetical person who is assumed to be continuously present near (typically within 30 m) a transportation corridor for all spent nuclear fuel shipments or at the closest publicly accessible locations for a fixed site (such as the proposed PFSF storage area).

Curie (Ci): The basic unit used to describe the intensity of radioactivity in a sample of material. A curie is a quantity of any radionuclide that decays at a rate of 37 billion disintegrations per second.

Picocurie per gram (pCi/g): One trillionth part of a curie of a radioactive substance in a gram of matter. This unit is often used to express the quantity of radioactivity in water, soil, vegetation and animal tissue samples.

Rad: The rad is a unit of absorbed radiation dose in terms of energy. One rad is equal to an absorbed dose of 100 ergs/gram.

Rem: The unit of equivalent dose in humans. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor. The quality factor is the modifying factor used to derive dose equivalent from absorbed dose. This factor is necessary because differing radiation types can produce different biological effects even if they deposit the same amount of energy in a given tissue.

Person-rem: The sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation.

Person-sievert (person-Sv): A unit of collective dose equivalent to 100 person-rem.

Sievert (Sv): A unit dose equivalent to 100 rem.

Latent cancer fatality (LCF): A latent cancer fatality is a death from cancer resulting from, and occurring an appreciable time after, exposure to ionizing radiation. The probability of developing a fatal cancer from exposure to 1 rem of ionizing radiation is estimated to be 0.0005 (5 chances in 10,000). The coefficients or factors used for health effects in this FEIS for the public and occupational radiation risk are 5×10^{-4} and 4×10^{-4} health effects/rem, respectively. These coefficients are based on data obtained at much higher doses and dose rates than those encountered by the general public or workers. A linear extrapolation from the lowest doses at which effects are observable down to the occupational range was used to generate these coefficients. The assumption of a linear extrapolation has considerable uncertainty, but is believed to present a conservative estimate of the risk.

In a population of 10,000 people, national statistics indicate that about 2,224 people would die from cancer of one form or another. Using information developed by the International Commission on Radiological Protection, if all 10,000 people received a dose of 200 millirem (in addition to the normal background radiation dose), 1 additional cancer fatality would be estimated to occur in that population. However, we would not be able to tell which of the 2,225 fatal cancers was caused by radiation, and the additional radiation would possibly cause no fatal cancers.

Sometimes, calculations of the number of latent cancer fatalities associated with radiation exposure do not yield whole numbers, and may in fact yield numbers less than 1.0. For example, if each individual in a population of 100,000 received a total dose of 0.001 rem, the collective dose would be 100 person-rem and the corresponding estimated number of latent cancer fatalities would be 0.05 (that is 100,000 persons × 0.001 rem × 0.0005 latent cancer fatality per person-rem). Because this numerical result is less than 1 fatality, further interpretation (as discussed below) is required. The result must be interpreted as a statistical estimate. That is, 0.05 is the *average* number of death that would result if the same exposure situation were applied to many different groups of 100,000 people. For most groups, no single individual would incur a latent cancer fatality from the 0.001 rem dose each person would have received. In a small fraction of the groups, 1 latent fatal cancer would result; in exceptionally few groups, 2 or more latent fatal cancers would occur. The *average* number of deaths over all of the groups would be 0.05 latent fatal cancer (just as the average of 0, 0, 0, and 1 is 1/4 or 0.25). For the scenario under discussion, the most likely outcome for any single group of exposed persons is 0 latent cancer fatalities.

PFS collected five soil samples from the surface of the proposed site in November 1996. The approximate locations of the samples were at the center and at each of the four corners of the site. The radiological analysis consisted of gross alpha/beta spectrometry for radionuclide concentrations. Detectable alpha radiation ranged from 8.6 to 11 pCi/g, and the beta from 22 to 37 pCi/g. A gamma spectrometry analysis was also conducted on the soil samples. The range of results, above detectable limits, included the radionuclides shown in Table 3.19. With the exception of cesium-137 (which originates from atmospheric nuclear tests), the radionuclides in Table 3.19 are all parts of the decay chain of naturally occurring uranium. These concentrations are in general agreement with similar surveys performed for the nearby Envirocare of Utah site at Clive, Utah, about 40 km (24 miles) northwest of the proposed PFSF site (NRC 1993) (see Figure 1.1).

Table 3.19. Radionuclides found in five soil samples from the proposed PFSF site

Radionuclide	Range of activity (in pCi/g)
Potassium-40	10 to 16
Cesium-137	0.07 to 6.1
Lead-210	0.58 to 1.1
Bismuth-212	0.97 to 1.3
Lead-212	0.50 to 0.85
Bismuth-214	0.92 to 1.4
Lead-214	0.76 to 1.1
Radium-223	0.24 to 0.52
Radium-224	3.0 to 9.6
Radium-226	1.3 to 2.3
Actinium-228	0.75 to 1.2
Protactinium-231	2.2 to 3.1
Uranium-235	0.08 to 0.14
Uranium-238	0.57 to 1.4

Source: PFS/ER 2001.
Note: Only radionuclides with activities above detectable limits have been included.

There are no perennial surface waters within 8 km (5 miles) of the proposed PFSF site, and, consequently, no water samples were taken for radiological analysis. Although no radiological samples of the vegetation were obtained, an indication of the radiation levels in area vegetation and in the flesh of mammals (i.e., rabbits) was reviewed as part of the environmental study for the Envirocare facility (NRC 1993) and is summarized in Table 3.20.

Although PFS considers the background radioactivity levels in vegetation and mammal flesh in the vicinity of the Envirocare facility to be representative of the background radioactivity levels near the proposed PFSF site and along the proposed Skunk Ridge rail corridor, PFS has stated that it will establish a preoperational radiological environmental baseline. The baseline will include sampling for radioactivity in soil, groundwater, vegetation, and the flesh of non-migratory mammals near the proposed PFSF site.

Table 3.20. Radionuclides found in vegetation and rabbit flesh as part of the Envirocare environmental study

Radionuclide	Activity in vegetation (average, pCi/kg)	Activity in rabbit flesh (average, pCi/kg)
Lead	198.0	4.0
Polonium-210	48.0	8.0
Radium-226	3.1	0.6
Thorium-230	6.0	0.5
Uranium	5.4	0.5

Note: Activities are shown on a "wet weight" basis.
Source: U.S. Nuclear Regulatory Commission, 1993, *Final Environmental Impact Statement to Construct and Operate a Facility to Receive, Store, and Dispose of 11e.(2) Byproduct Material Near Clive, Utah*. Docket No. 40-8989, NUREG-1476. Washington, D.C.

3.8 Other Environmental Features

3.8.1 Ambient Noise Levels

Background noise levels in Skull Valley are low. Where natural sounds, such as those from flying insects and wind become dominant, daytime sound levels can drop to 30 dB(A) and lower. This is quieter than many locations that are considered "remote." However, the relative quiet of Skull Valley is interrupted by routine military flight operations. Existing vehicle traffic increases noise levels near Skull Valley Road, especially in areas where people congregate. Daytime background levels of 48 to 50 dB(A) have been measured about 18 m (60 ft) from Skull Valley Road near the Pony Express Convenience Store. For comparison, EPA (1974) has provided guideline sound levels below which the general public would be protected from activity interference and annoyance; 55 dB(A) applies to outdoor locations "in which quiet is a basis for use" and 45 dB(A) applies to indoor residential areas.

3.8.2 Scenic Qualities

The proposed PFSF would be located approximately in the center of the southern third of Skull Valley. This portion of the valley is largely undeveloped and features numerous scenic qualities, including clear views of the Stansbury Mountains to the east (see Figure 3.10) and distant views of the Cedar Mountains to the west (see Figure 3.11). The Stansbury Mountains rise to heights of over 2,743 m (9,000 ft) in several places, with Deseret Peak being over 3,352 m (11,000 ft). Some ridges in the Cedar Mountains are at elevations of over 2,134 m (7,000 ft). These two mountain ranges define Skull Valley and provide its most important scenic qualities.

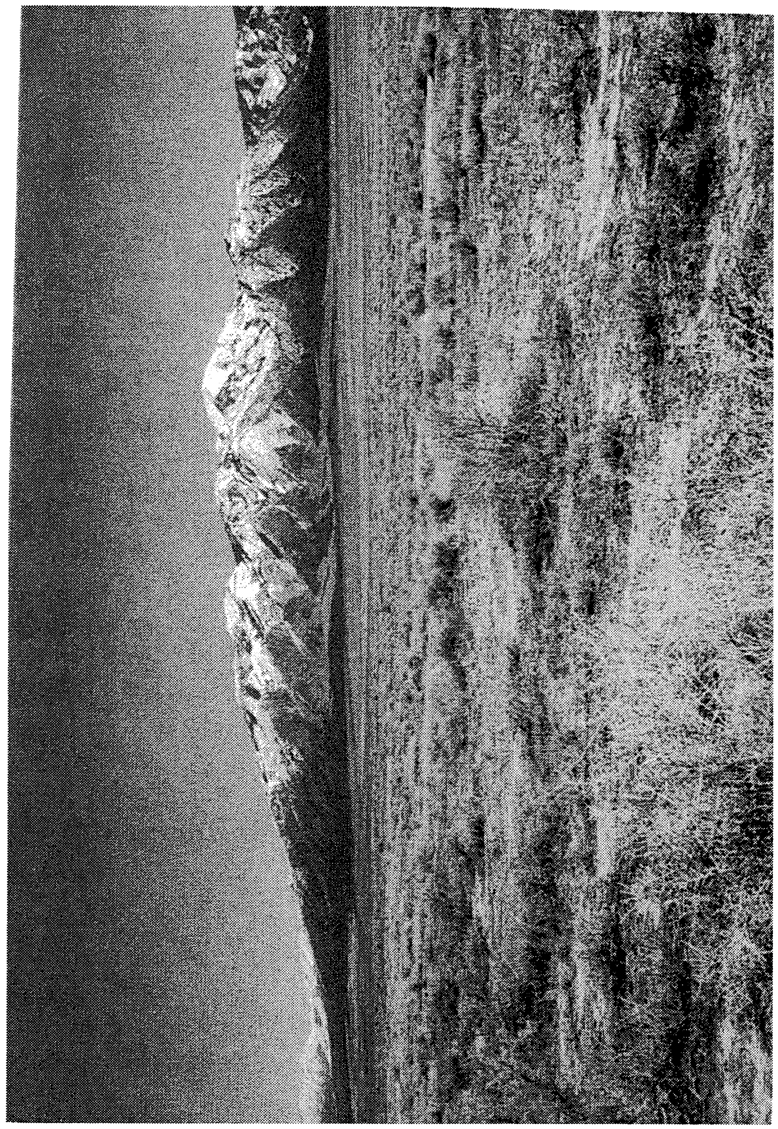


Figure 3.10. View from the proposed PFSF site looking east toward the Stansbury Mountains.

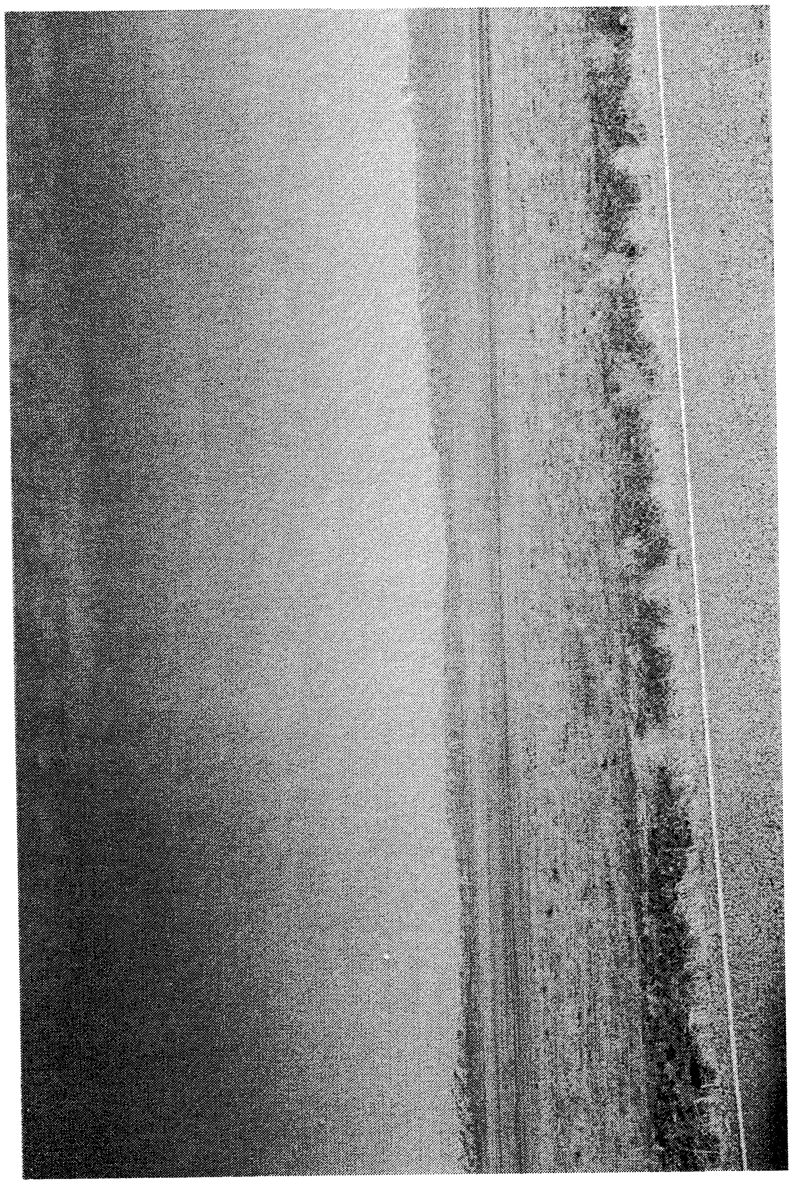


Figure 3.11. View from looking west toward the Cedar Mountains.

The proposed site also offers expansive views across the floor of Skull Valley between the mountain ranges. The landscape in the vicinity of the proposed site is dry rangeland interspersed with some irrigated fields. Several ranch residences and ranch-related buildings with small numbers of cattle are scattered throughout the valley, but the predominant landscape characteristic is the vast expanse of undeveloped and uncultivated land.

The most noticeable manmade feature in the valley is Skull Valley Road, which is located just west of the Stansbury Mountains and about 20 km (12 miles) east of the Cedar Mountains. A single overhead power distribution line on wooden poles parallels Skull Valley Road from Interstate 80 south to Dugway.

Skull Valley is most often viewed by local residents and motorists on Skull Valley Road. There are approximately 150 residents of the valley, and Average Daily Traffic (ADT) on Skull Valley Road in 1997 was 325 vehicles south of the town of Iosepa (PFS/ER 2001) (see Table 3.15). In terms of visual exposures to the proposed site, this ADT represents almost 120,000 annual vehicle trips multiplied by the average number of passengers per vehicle. Most of the ADT on the road is comprised of trips made by the relatively few individuals who reside or work in Skull Valley or Dugway.

Skull Valley is also viewed by hikers, hunters, campers, and other visitors in the Wasatch-Cache National Forest and the Deseret Peak Wilderness area to the east, and in the Cedar Mountains Wilderness Study area to the west. In 1997, for example, there were 9,600 visitor days classified as hiking, hunting, and camping in the Deseret Peak Wilderness (J. Van Dyke, Oak Ridge National Laboratory, Oak Ridge, Tenn., personal communication with Jack Vanderberg, Acting Recreation Manager, Salt Lake Ranger District, Wasatch-Cache National Forest, January 27, 1999). Although data on the exact locations of recreational visits are not available, at least some visitors view Skull Valley from the Wasatch-Cache National Forest, the Deseret Peak Wilderness area, and the Cedar Mountains Wilderness Study area (see Section 3.8.3).

3.8.3 Recreation

BLM land in Skull Valley provides opportunities for recreation, including off-highway vehicle (OHV) use, dispersed camping, and hunting. Under its OHV designation, the BLM land near the proposed PFSF is open to all types of motor vehicle use (BLM 1992b). However, there are no designated camping areas or OHV trails or roads within a 8 km (5 mile) radius of the proposed PFSF (PFS/ER 2001). Horseshoe Springs, 24 km (15 miles) north on Skull Valley Road, is the closest developed recreation facility on BLM land (see Figure 1.2). BLM reports visitor use of this area at 500 to 1,000 visits per year (PFS/ER 2001), although there is a considerably greater recreational use of BLM land in areas just outside Skull Valley.

In addition to BLM land, recreational visitors use other resources in the vicinity of the proposed project, including Mount Deseret [approximately 15 km (9 miles) northeast of the proposed PFSF] in the 10,120 ha (25,000 acre) Deseret Peak Wilderness located within the Stansbury Mountain unit of the Wasatch-Cache National Forest. The U.S. Forest Service manages the area for primitive recreational use at dispersed locations; developed recreational facilities and motorized vehicles are prohibited in wilderness areas. Recreational activity includes hiking, hunting, and horseback riding. The number of annual recreational visits to the Deseret Peak Wilderness is estimated at 18,000 (PFS/RAI1 1999). In addition to the Deseret Peak Wilderness, the Forest Service provides recreational opportunities in the Wasatch-Cache National Forest, including camping and hiking. The Forest Service estimates 17,000 visits annually within the six campgrounds maintained by the Forest Service in the Wasatch-Cache National Forest and 9,500 visits per year to two trail heads maintained within the Wasatch-Cache National Forest. Besides the view of the landscape, the Skull Valley Road provides significant opportunities to view raptors.

Wilderness. The BLM also administers the 20,445 ha (50,500 acres) Cedar Mountains Wilderness Study Area (WSA), which provides opportunities for solitude, primitive and unconfined recreation, including the opportunity to view wild horses, deer and upland game hunting, hiking, backpacking, and horseback riding and packing (BLM, Utah Wilderness Inventory 1999, accessed from the internet at http://www.ut.blm.gov/wilderness/wrpt/wrptcontents.html).

In addition, the BLM has recently re-inventoried some lands within Utah, including areas near the Cedar Mountains WSA for their wilderness characteristics. This re-inventory identified six units (i.e., parcels of land or sections) adjacent to the Cedar Mountains WSA, with a total of 6,290 ha (15,540 acres), having wilderness characteristics (BLM, Utah Wilderness Inventory 1999, accessed from the internet at http://www.ut.blm.gov/wilderness/wrpt/wrptcontents.html). Of these six units, Units 1, 2, and 3 are on the northern, northeastern, and eastern portions of the Cedar Mountains WSA, respectively, and are closest to the route of the proposed rail line from Skunk Ridge to the proposed plant site (see Figure 3.12).

The six units enhance the opportunities for solitude and primitive recreation found within the adjacent Cedar Mountains WSA. In addition, Unit 1 has supplemental values related to a historic trail. Hastings Cutoff through Hastings Pass at the northern end of Unit 1 was once the path taken by travelers using the historic California Trail. The Hastings Cutoff segment of the California Trail was the route taken by the Donner Party on their fateful journey to California. The California Trail is a designated National Historic Trail (BLM, Utah Wilderness Inventory 1999, accessed from the internet at http://www.ut.blm.gov/wilderness/wrpt/wrptcontents.html).

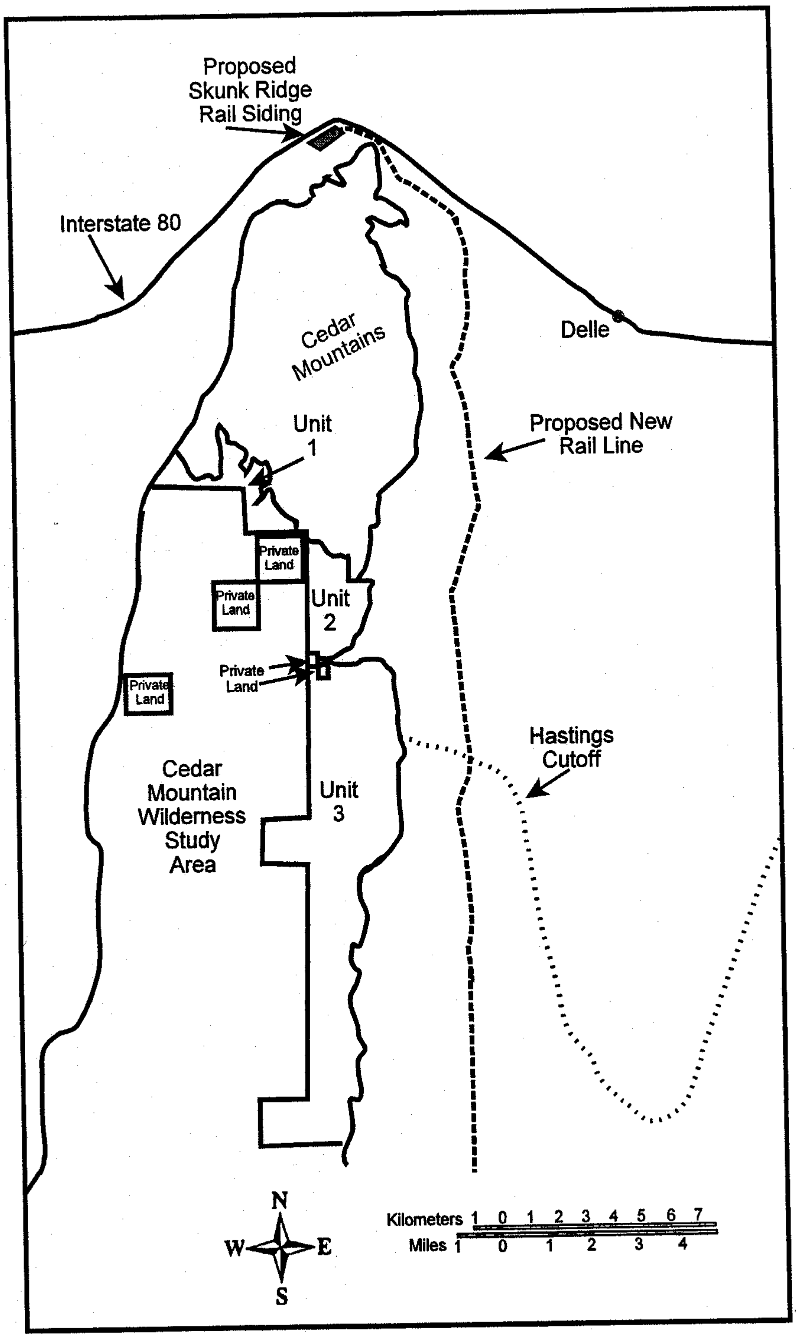


Figure 3.12. Wilderness study areas and unit areas recently inventoried for their wilderness characteristics.

4. ENVIRONMENTAL CONSEQUENCES OF CONSTRUCTING AND OPERATING THE PROPOSED PFSF

This chapter describes how the natural and human environment could be affected by the construction, operation, and decommissioning of the proposed facility in Skull Valley, Utah. This chapter presents or references relevant data, describes the approach and methods used to predict future environmental effects, and presents an assessment of the potential environmental impacts.

Each subsection describes, as appropriate, any potential impacts to specific categories of environmental resources. Each subsection also contains a concluding statement as to whether the potential impacts are judged to be small, moderate, or large. The standards used for these concluding statements are presented in the dialogue box below. In addition to a discussion of the potential impacts, the possible mitigation measures that could be employed to eliminate or reduce the magnitude of any impacts are also presented and discussed within each subsection. Each subsection identifies certain of the possible mitigation measures that the Cooperating Agencies recommend be required. See Section 9.4.2 for a complete list of the mitigation measures that the Cooperating Agencies recommend be required.

The proposed action under consideration in this FEIS involves the construction and operation of the proposed PFSF in Skull Valley, Utah, and the construction and operation of new transportation facilities in Skull Valley for moving SNF to the proposed PFSF. This chapter does not address the impacts of constructing and operating either a new rail line or an ITF. The environmental impacts of the new transportation facilities are discussed in Chapter 5 of this FEIS. This chapter focuses only on the construction and operation of the proposed PFSF on the Reservation. It should be noted that assessments were made considering either a 20-year or a 40-year (assuming license renewal) period of operation for the proposed PFSF. Where the 40-year period was assumed, this reflects a conservative analysis.

Section 4.9 also discusses decommissioning of the proposed PFSF. This discussion is based on currently available information. Because decommissioning would take place well into the future, all technological changes that could improve the decommissioning process cannot be predicted. As a result, the NRC requires that an applicant for decommissioning of an ISFSI submit, at least 12 months prior to the expiration of the NRC license, a Decommissioning Plan. The requirements for the Final Decommissioning Plan are delineated in 10 CFR 72.54(g)(1)–(6), 72.54(d), and 72.54(i). This plan will be the subject of further NEPA review that would result in the NRC staff's preparing an environmental assessment or environmental impact statement, as appropriate, at the time the Decommissioning Plan is submitted to the NRC.

As shown in Figures 2.1 and 2.11, there are two potential sites for the proposed PFSF in Skull Valley. Both sites are located on the Reservation. The proposed action being evaluated in this FEIS involves a location for the proposed PFSF in the northwest corner of the Reservation, which is designated as "Site A" (see Figure 2.1). An alternative site, also being evaluated in this FEIS, lies to the south of Site A on the Reservation and is designated as "Site B" (see Figure 2.11). The assessments described in this chapter distinguish the impacts associated with Site A from those at Site B wherever possible.

DETERMINATION OF THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS

A standard of significance has been established by NRC (see NUREG-1437) for assessing environmental impacts. With the standards of the Council on Environmental Quality's regulations as a basis, each impact is to be assigned one of the following three significance levels:

- ***Small:*** The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- ***Moderate:*** The environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- ***Large:*** The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

4.1 Geology and Soils

This section discusses the assessment of potential environmental impacts to geologic resources (such as minerals) and soils during site preparation, construction, and operation of the proposed facility. Impacts could result from planned excavation activities for the proposed PFSF and the consumption of mineral resources for use in roadbeds and as materials of construction. The adequacy of the proposed PFSF design to withstand earthquakes is addressed in the NRC's SER, as updated, and is not addressed in this FEIS.

4.1.1 Construction Impacts at the Preferred Site (Site A)

Environmental impacts to soils include loss of the soils resource because of physical alterations to the existing soil profile. These alterations lead to a reduction in the soils' ability to support plant and animal life and may possibly lead to changes in windborne erosion patterns, changes in surface water drainage and erosion patterns, and changes in infiltration characteristics. The impacts to land use and the loss of vegetation and habitat are described in Sections 4.4 and 4.5, windborne erosion impacts in Section 4.3, surface water drainage and water erosion impacts in Section 4.2, and infiltration impacts in Section 4.2. Impacts would also occur to economic geologic resources (e.g. aggregate) from their use as construction materials and from possible access restrictions to minerals beneath the site. As discussed below, impacts involving the loss of the soils resource and the loss of economic geologic resources would be small.

The assessment for the loss of the soils resource compares the amount of soil to be lost at the proposed PFSF site with the amount of similar soils resources available in Skull Valley. The assessment of impacts to economic geologic resources (e.g. aggregate) compares the estimated amount of materials required for construction with the availability of those resources in the area. It also considers the impacts to mineral resource exploitation in the immediate area of the proposed PFSF.

The uppermost 23 cm (9 inches) of soil on the 99-acre pad area [(roughly 92,500 m^3 (121,000 yd^3)] would be stripped and used for construction of the earthen flood protection berms, and for access and perimeter roadway slope dressing. The pad area would then be further excavated to a depth of about 1.5 m (5 ft), and the spoils [i.e., about 61,000 m^3 (800,000 yd^3)] would be stockpiled and used to make a soil/cement pad base material (see Section 2.1.1.2). None of this spoil material would leave the site; thus, there would be no impacts to any potential off-site fill areas or disposal sites (see Section 4.9 for decommissioning of the berms). Even if all of this soil is used in the soil/cement mixture, it represents a loss of less than 0.04 percent of the upper 1.2 to 2 m (4 to 6 ft) of soil in Skull Valley. While small differences exist in the characteristics of Skull Valley soils, they are generally similar, and those at the proposed PFSF site have no unusual characteristics that make them of greater intrinsic value. The impacts involving loss of the soils resource is thus considered to be small.

The cask storage pads would be independent structural units (see Figure 2.3). Each pad is 9 m wide by 20 m long by 1 m thick (30 ft wide by 67 ft long by 3 ft thick). Excavation of soils at the preferred site would be required so that the pads would be flush with grade level for direct access by the cask transporter. Foundation preparation for the pads would consist of the necessary soil excavation and placement of a 0.6-m (2-ft) thick concrete soil/cement mat on the in-situ soil. The bottom of the mat and the bottom of the storage cask pads would be well below the local frost depth of 75 cm (30 inches) below grade level (PFS/ER 2001). This would prevent upward movement of the pads due to the “heaving” and other ground motions associated with the freeze-thaw cycle. PFS has performed field and laboratory geotechnical investigations of site soils. The adequacy of those studies to assess site soils and the test results to demonstrate that site soils can accommodate the storage cask pads and canisters is addressed in PFS’s SAR (PFS/SAR 2001) and the NRC SER, as updated.

Resources such as concrete aggregate, crushed rock, and asphalt would be required during construction of the proposed PFSF. Table 4.1 compares anticipated construction material requirements for all phases of construction of the proposed PFSF with estimated quantities of such materials available from five private, commercial sources in the vicinity of Skull Valley (see Table 3.2). PFS would be able to use any or all of these locations for the source of construction materials (PFS/ER 2001). These five sites are located within 10 to 75 highway km (6 to 48 highway miles) of the proposed PFSF. BLM notes the existence of five additional sand and gravel pits within and immediately outside Skull Valley but provides no material quantity estimates. However, considering only the estimated quantities of material available from the five private, commercial sources in Table 4.1, no more than about one-third of this material would be required for the proposed PFSF construction. Including other sources, such as those on BLM land, would reduce that percentage further. The impacts on aggregate material for site construction are thus considered to be small.

Table 4.1. Comparison of PFSF construction material requirements with quantities of materials commercially available in the vicinity of Skull Valley

Material type	Material required	Material available
Concrete aggregate		
Small (sand)	87,900 m^3 (115,000 yd^3)	300,000 m^3 (393,000 yd^3)
Large (crushed rock)	103,300 m^3 (135,200 yd^3)	465,000 m^3 (607,000 yd^3)
Crushed rock for access road base, rip-rap, storage area, and building grading	102,700 m^3 (134,600 yd^3)	600,000 m^3 (786,000 yd^3)

Mineral resources located beneath the site would be unavailable for exploitation during construction. However, the impacts from this unavailability would be small due to the wide availability of similar minerals in the region. No mitigation measures are warranted for the loss of the soils resource or the unavailability of minerals during facility construction.

4.1.2 Impacts During Operations at the Preferred Site

Operational impacts include the use of aggregate and materials used for the continued construction of the concrete storage pads and the unavailability of mineral resources. These impacts are included in the discussion above and have been determined to be small. Other than construction of the storage casks themselves, materials needed for facility construction would no longer be needed, and no further depletion of those resources would be anticipated. No mitigation measures are warranted for the loss of soils resources or the unavailability of minerals during facility operation.

4.1.3 The Alternative Site (Site B) in Skull Valley

The impacts to soils and economic geologic resources for the alternative site (Site B) are the same as for the preferred site (Site A). The geologic setting for the alternative site (Site B) is not environmentally differentiable or significantly different from the preferred site (Site A). Thus, the environmental impacts to soils and economic geologic resources from the construction and operation of the proposed PFSF at Site B would not be quantifiably different from those at the preferred site (Site A). No mitigation measures are warranted for the loss of the soils resource or the unavailability of minerals during construction or operation of the facility operation at the alternative site (Site B).

4.1.4 Mitigation Measures

Based on the above discussion of the impacts to soils and economic geologic materials (aggregate), no mitigation measures were identified that would appreciably reduce the impact, beyond those described in Sections 4.2, 4.3, 4.4, and 4.5 to address the types of impacts identified in the first paragraph of Section 4.1.

4.2 Water Resources

This section discusses the assessment of potential environmental impacts to surface water and groundwater during construction and operation of the proposed PFSF including the proposed site access road from Skull Valley Road to the site. The discussion includes the potential impacts to surface water flow at the valley-wide scale, as well as impacts to natural drainages on and around the site, and potential degradation of water quality or supply.

4.2.1 Construction Impacts at the Preferred Site (Site A)

4.2.1.1 Surface Water

This section discusses potential impacts to the surface water flow system during and as a result of construction activities. Construction of the facility and the site access road are discussed separately.

Facility construction. As discussed below, impacts to the surface water flow system in Skull Valley would be small as a result of construction of the facility at the preferred site. Small impacts to local ephemeral drainage features would occur during and as a result of the construction and presence of the facility.

Construction of the proposed PFSF would require modification of the existing surface drainage system within the site footprint and small changes in surface water runoff volumes and patterns would result. The principal modification to local surface drainage features would be the construction of the flood diversion berm, an approximately 1,310 m (4,300 ft) earthen berm along the southern and western sides of the facility (see Figure 2.2). This berm would divert normal and flood flows of surface water from upslope and adjacent areas from the west to a discharge location near the northwest corner of the facility. The proposed PFSF is 40-ha (99-acre) facility in which existing surface drainage features would be modified to provide engineered foundations and a contained runoff area for the facilities. The total watershed area of Skull Valley is 181,000 ha (448,000 acres). The footprint of the facility is 0.02 percent of the total watershed area. Alteration of the surface water runoff or infiltration characteristics of this small proportion of the watershed would not have a noticeable effect on surface water flows in the Skull Valley watershed.

After construction of the surface water detention basin, surface runoff from within the facility area would be directed into the basin where infiltration into soils and evaporation would occur. According to PFS's construction sequencing plan (PFS/ER 2001), the first period of activities in Phase 1 construction would include construction of the site access road with its flood protection berm, and initial earthwork in the southeast quadrant of the cask storage area. During the second period of Phase 1 construction activities the storage area would be leveled, the facility's flood protection berm constructed, and the surface water detention basin would be constructed. During a short time (weeks) in Period 1 and an unspecified time in Period 2, there would be a potential for water erosion to transport disturbed site soils into the local drainage features in the event of severe storms. The magnitude of such effects would depend on unpredictable seasonal variables in weather conditions. Assuming that erosion control measures would be implemented and would function as intended, impacts to local surface water drainage channels would be small. Additional discussion of potential impacts from flooding during extreme events is presented below.

Once constructed, the site surface water runoff collection system would be sized to contain all site runoff up to and including the precipitation associated with a 100 year flood event (i.e., 100 year flood). This would prevent the site from having any adverse effect on area flooding under conditions equal to or less than a 100-year flood. The construction BMPs (see Section 2.1.4) include measures to protect the local drainage features outside the immediate construction footprint from siltation. Pursuant to 40 CFR 122.26(b)(14), PFS would be required to obtain an NPDES permit to protect surface waters from pollutants that could be conveyed in construction-related storm water runoff and would be required to prepare a Stormwater Pollution Prevention Plan.

Site access road. As discussed below, any impacts on the surface water flow system related to construction of the site access road would be small.

The site access road would connect the proposed PFSF with Skull Valley Road to allow site access for construction and operations personnel. Under normal weather conditions, and considering the BMPs that PFS would use to control erosion and sedimentation of surface flow channels, any effects on the surface water drainage system during the construction period would be small. Pursuant to

40 CFR 122.26(b)(14), construction activities for the site access road would also be subject to the terms of the required NPDES permit and PFS's Stormwater Pollution Prevention Plan.

Potential impacts to surface water quality. Potential impacts to surface water quality during construction would be small. Potential events that might cause water quality impacts include soil erosion followed by offsite transport of suspended solids and turbidity associated with storms, as well as accidental fuel spills in uncontrolled areas. Fugitive dust from site construction could be controlled to acceptable levels without using any chemicals (see Section 4.3). PFS has not indicated, nor have the Cooperating Agencies recommended, the use of chemicals for surface wetting activities. Therefore, water used for surface wetting and soil compaction would not likely contain any chemicals and therefore would not impact surface water.

PFS is committed to implementing BMPs (see Section 2.1.4) that include measures to prevent or minimize erosional impacts to the surface water system. In the event that extreme weather conditions should occur during construction, the possibility exists that localized soil erosion and transport could occur causing downstream channel siltation. Although such an event is unlikely, potential mitigation measures that could reduce the impact of such an event are described below.

If an accidental spill of petroleum hydrocarbon fuel occurred while rainfall or snowmelt was causing surface flow through the site during construction, there could be an adverse impact on surface water. Protection of surface water quality under such conditions would require an emergency spill response to intercept and clean up spilled fuel, affected surface water, and soil. PFS's Best Management Practices Plan would prescribe methods for minimizing or eliminating the potential impacts from spills.

Potential impacts related to flooding. In the unlikely event that severe flooding should occur during construction of the proposed PFSF and the site access road, moderate impacts to the surface water hydrological system could occur.

BMPs that would be used during construction of the proposed PFSF and the access road include erosion and siltation control for normal events. A severe flood event could occur during the construction phase. Such an event would likely overwhelm the BMPs measures and could result in erosion of disturbed soils or portions of embankments with deposition of the eroded materials in channels downstream of the work sites. The severity of such an impact would vary with the storm intensity. Such potential impacts are judged to be moderate because a severe flooding event would also affect adjacent areas and would likely cause erosion and channel siltation that would not otherwise occur in these areas in the absence of the proposed PFSF. Should severe flooding (i.e., from storms associated with the 100-year flood or greater) occur, eroded materials from the construction site would be commingled with the natural material transported by flood flows. This erosion would be indistinguishable from the impacts of the natural erosion processes during floods.

4.2.1.2 Water Use

Construction of the facility would have a small impact on water availability in Skull Valley. Information provided by PFS indicates that Phase 1 construction activities would use water at rates that vary from about 102 m^3/day (27,000 gal/day) to over 520 m^3/day (138,300 gal/day) (PFS/ER 2001). Additional quantities of water would be required for the planned revegetation of disturbed areas. The volume of water needed is dependent upon the method used to revegetate the area. The water requirements will be determined during the development of a final revegetation plan. Therefore, no estimate is available at this time as to how much water would be needed for this purpose.

As can be seen in Figure 4.1, a large amount [as much as 511 m^3/day (135,000 gal/day)] of the water used for construction activities, including Phases 1, 2, and 3, would be obtained from offsite sources and would be trucked to the site for use in dust suppression, concrete mixing, and soil cement mixing. PFS has obtained information from private water suppliers that indicates the required volumes of water anticipated for project construction needs are readily available in the northern portion of the Stansbury Mountains without impact to regional water availability (PFS/RAI2 1999c).

4.2.1.3 Groundwater

The potential impacts from the proposed use of groundwater would be small. The use of onsite groundwater would vary from about 13 to 38 m^3/day (3,300 to 10,000 gal/day) (PFS/ER 2001) during Phase 1 construction. The peak groundwater use estimate would be satisfied with an onsite groundwater production capacity of about 0.025 m^3/min (7 gal/min), which is a moderate yield requirement. Figure 4.1 shows the anticipated water use levels during Phase 1 construction and shows the estimated cumulative total water use through the period. During later phases of construction (about years 3 and 7 after project initiation based on PFS's projected schedule), there would be two repeat periods when water use would increase to about 358 to 449 m^3/day (94,600 to 118,600 gal/day). These periods would be relatively short (2 to 3 months) and most of the water used for the later construction phases would be brought to the site from offsite sources as they would be during the Phase 1 construction activities.

There is some uncertainty as to the availability of sufficient groundwater quantity on site to meet the expected needs. The greatest uncertainty is whether the sedimentary deposits beneath the site contain enough sandy zones that are hydraulically connected to the sandy aquifer along the eastern valley margin to supply the desired water quantity. It is very likely that little aquifer recharge occurs on the site or elsewhere near the center of Skull Valley because of low annual precipitation and because surficial and near-surface deposits are silt and clay that have low permeability and inhibit downward percolation of water (Hood and Waddell 1968).

Based on analysis provided by PFS using the average water pumping rate during the project, the drawdown from a well constructed on site is not expected to extend beyond about 2.1 km (7,000 ft) from the pumped well (see SWEC Calculation 05996.02-G(B)-15, Rev. 1 as cited in PFS/ER 2001). The nearest well to the proposed PFSF is located on the Reservation approximately 3.2 km (2 miles) away. Assuming the radius of influence of the pumped well for the PFSF is approximately 2.1 km (7000 ft) it would be possible to site such a well on the Reservation at a location where the drawdown would not affect off-Reservation groundwater users. The basis for PFS's analysis is interpretation of a single, short-duration test in a small diameter well on site, with a test interval approximately 8 m (25 ft) long. The analysis assumed that a production well would have a screened interval 33 m (100 ft) long and a range (0.01 to 0.3) of the aquifer storage coefficient (water yield per unit of water level drawdown) was assumed. Wells drilled deeper than the previous test borings may encounter higher water yields; however, very few existing wells are located near the center of the valley to provide a basis for comparison.

While PFS's analysis appears reasonable, there is not sufficient information available concerning the water producing characteristics of the central valley area to refine a potential groundwater availability analysis. Assuming PFS's evaluation is correct, it is unlikely that any existing groundwater users in Skull Valley would be affected by groundwater pumping for the facility construction. Nevertheless, in the event that onsite water quality or water quantity are inadequate, PFS has made arrangements that potable water would be obtained directly from the existing Reservation supply or from additional wells

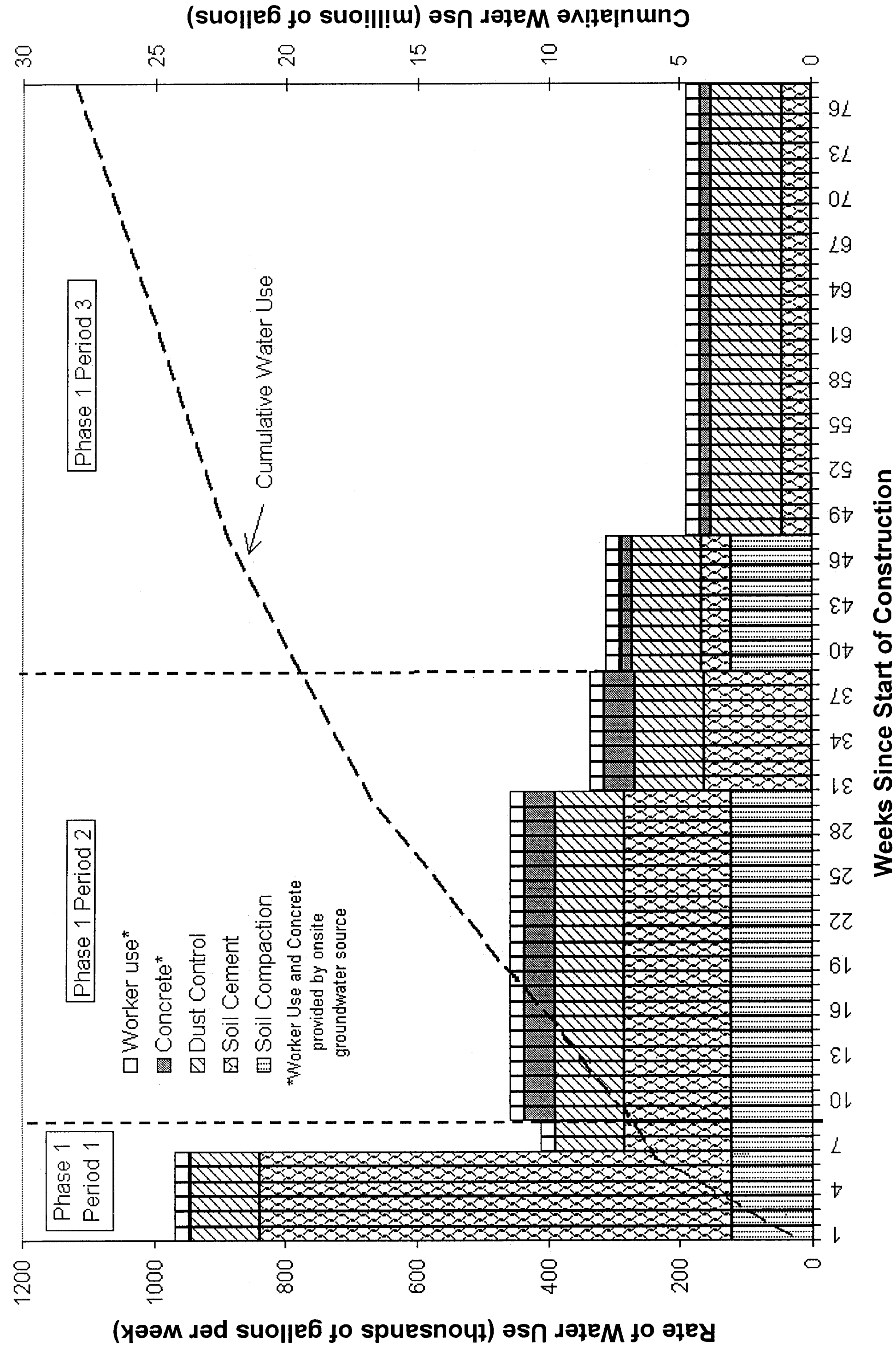


Figure 4.1. Estimated water use during construction of the proposed PFSF.

that would be drilled east of the site. PFS has made inquiry of persons familiar with water quantities and usage in the Skull Valley area and has reported that three permitted wells within a 24 km (15 mile) radius of Low, Utah, are capable of producing 1,510 m^3/day (400,000 gal/day) each. Current withdrawal of water from those wells is less than half the permitted quantity (PFS/RAI3 2000). Accordingly, impacts to groundwater use during construction are expected to be small.

Construction of the site access road would require water for dust control and soil compaction. Water for these purposes would be acquired from offsite sources and trucked to the site for use. There would be no impact on groundwater availability in Skull Valley since all water required for road construction would be acquired offsite from private water suppliers.

Potential impacts to groundwater quality. Potential impacts to groundwater quality from the proposed PFSF construction activities would be small. Spills of liquids (such as fuels) on the PFSF site during facility and access road construction activities could potentially have an adverse impact on groundwater quality if the spills were very large and if no mitigating cleanup actions were taken. A large fuel spill would be required to adversely impact groundwater quality at the site because the groundwater table is approximately 38 m (125 ft) below the ground surface and soil retention would hold up the liquid. Soils in central Skull Valley are silty soils and percolation of spilled liquids would not be extremely rapid. Furthermore, PFS would prepare a Best Management Practices Plan which would prescribe methods to mitigate any potential impacts to groundwater from fuel leaks or spills.

4.2.2 Impacts During Operations at the Preferred Site

This section discusses potential impacts to the hydrological system, including the surface water flow system, water use, and water quality during operation of the facility.

Above-ground fuel tanks would be used at the site to store vehicle fuel. PFS's Best Management Practices Plan could prescribe methods for properly responding to fuel leaks or spills to minimize fire hazard or contamination of groundwater. To ensure that construction and operational activities will not lead to contamination of groundwater, the Cooperating Agencies propose that PFS be required to implement a BMP including a spill response procedure, and be required to be responsible for clean up of spills or accidents on the facility site in conformance with applicable standards (see Section 9.4.2).

4.2.2.1 Surface Water

This section discusses potential impacts to the surface water flow system during operation of the facility. Potential impacts related to the facility and the site access road are discussed separately below.

Facility operation. Potential impacts to surface water during facility operation are expected to be small. Under normal conditions there is no surface water flow in the vicinity of the proposed PFSF site. As discussed in Section 4.2.1, the presence of the facility would alter some of the dry washes that normally carry stormwater and snowmelt water across the site area. Normal flows that would occur upslope of the facility would be diverted around the site by the flood diversion berm and would flow into a single existing natural runoff channel near the northwest corner of the facility. Small changes in the channel may occur as a result of concentrating flows from several pre-existing channels into one. Drainage channels along the flood protection berm would be stabilized and lined with rock to reduce flow velocity and prevent scouring.

The spent fuel containment system that would be used at the PFSF is a zero release system, and there would be no radioactive discharges to the detention basin. Operation of the proposed PFSF would not create excess runoff that would have adverse downstream impacts. There would be no discharge of water to the land surface. All surface runoff generated within the 40-ha (99-acre) area from precipitation events up to, and including, the 100-year storm event would be collected in a surface water runoff basin for infiltration and evaporation. Even if site runoff were not collected, there would be no adverse impact to flooding at the watershed scale because of the very small size of the proposed PFSF [40 ha (99 acres)] in comparison to the overall Skull Valley drainage basin area [181,000 ha (448,000 acres)]. The area that is developed for the project is 0.02 percent of the total Skull Valley watershed area.

Parking lots adjacent to the buildings at the proposed PFSF would occupy a total area of about 1.5 ha (3.5 acres) (see Section 2.1.1.2). Surface water runoff from these parking lots would be small in comparison to existing runoff from the proposed project area, and would therefore have a small impact on natural drainage patterns.

Site access road. Under normal conditions, the presence of the site access road would have a small impact on surface water flows. PFS's site access road design includes culverts installed at wet-weather surface water flow channel crossings that would accommodate flows up to and including the 100-year flood [about 6.9 cm (2.7 inches) in a 24-hr period)]. PFS has specified design criteria for placement of energy dissipating materials at culvert outlets for elements of the transportation system to prevent or minimize downstream erosion or scouring below culverts. Since the same criteria were used for the site access road, there would be no channel erosional impacts related to flows through culverts along the site access road from normal seasonal runoff.

4.2.2.2 Potential Impacts Related to Flooding

As discussed below, the presence of the proposed PFSF and site access road would incrementally increase the impacts resulting from extreme flood events. During flood conditions, the presence of the proposed PFSF would create only minor, incremental impacts beyond what would occur if the facility were not constructed. These impacts are judged to be small for the proposed PFSF and the site access road, and are discussed below.

The flood-related impacts associated with the project are summarized here. Detailed flood analysis information can be obtained in the NRC staff's SER (NRC/SER). As described in Section 4.2.1, the PFSF design incorporates an upslope flood diversion berm that would divert surface water runoff from the upland area toward Hickman Knolls and flood waters from drainage channels to the southwest. The diverted flow would be discharged into an existing arroyo near the northwest corner of the facility.

A flooding analysis was performed by PFS to determine if the proposed PFSF would be protected from floodwaters during a PMF. The PMF is the maximum credible flooding event that could occur in an area, and the analysis considers both local runoff and flooding that could result because of runoff from areas upstream in the surface water drainage basin. The PMF is a flood of severity greater than the 100-year flood. The flood analyses performed included the expected PMF water elevations in the site vicinity for the post-construction condition (access road embankment, railroad grade, PFSF facilities, and flood control berms assumed to be in place). Analyses were performed for both a general storm condition [about 31 cm (12.2 inches) of rainfall in a 72-hr period] and for a locally intense storm [about 27 cm (10.6 inches) in 6 hours]. More surface water runoff would be produced by the general storm than by the intense local storm. The flood analysis showed that the proposed PFSF would be protected from flooding during the PMF due to the presence of earthen berms uphill and at road and railroad access points.

A severe flood event could result in moderate impacts to surface water drainage channels adjacent to the proposed PFSF. Surface drainage features on the proposed PFSF site are shallow dry washes that carry occasional runoff from thunderstorms and snowmelt. Some of these features would be intersected by the facility, and upslope surface water in the washes would be diverted around the facility perimeter by the flood diversion berm. PFS's facility design description states that rip-rap would be used to prevent erosion of the berm during periods of flow. Although not identified in the design descriptions, a drainage swale would probably develop through natural flow and erosion processes upslope of the berm (outside of the facility area). Without adequate energy dissipating design, concentration of all natural upslope flow along the toe of the berm with discharge into a single, unprotected wash could cause erosion near the proposed PFSF with channel sedimentation downstream. Potential impacts could occur for storm events less severe than the 100-year event. PFS' proposed design includes flow routing and energy dissipating features in the design of the flood diversion berm that would mitigate this potential moderate impact.

The access road crosses Skull Valley and would be affected by severe flooding. The culvert systems at seven channel crossing locations along the site access road would be designed by PFS to accommodate water volumes associated with the 100-year, 24-hour storm event. The storm intensity associated with this frequency event would result in about 6.9 cm (2.7 inches) of rainfall within a 24-hour period. [The PMF analysis was applied to the site access road and the analysis determined that the roadway would be inundated by 0.75 to 1 m (2.5 to 3.2 feet) of water. This would temporarily prevent access to or egress from the facility. Such flooding would also likely cause some erosion of the road embankment requiring repairs prior to returning the road to service. PFS's facility design incorporates an earthen berm at the western end of the access road to protect the PFSF from potential flooding by waters that would overtop the access road embankment and could potentially be diverted into the facility area.]

Due to the presence of the access road embankment, during severe flood events some ponding of surface water could occur upstream of the access road. Such effects would be temporary and would include sediment deposition upstream of the road embankment that could alter the existing drainage features. Impacts could occur to vegetation in areas affected by short-term ponding and silt deposition. Erosion of soil from the road embankment or related to channel scour may cause local changes in the channel morphology downstream of the access road through siltation or scouring. Revegetation of embankments and other cleared areas is proposed by PFS and would reduce the potential impacts of channel siltation.

4.2.2.3 Water Use

PFS's estimate of operational groundwater use is expected to be less than 6.8 m^3/day (1,800 gal/day) (PFS/ER 2001). Based on PFS's analysis of the site groundwater conditions (see Section 4.2.1.3), it is anticipated that onsite wells would be capable of supplying the amount of water required during facility operations. In the event that onsite water quality or water quantity are inadequate, potable water would be obtained directly from the existing Reservation supply wells or from additional wells that would be drilled east of the site where the aquifer yield may be greater. Further NEPA review may be required by BIA for any additional water wells drilled off the lease site.

4.2.2.4 Groundwater

Potential impacts to groundwater quality from operation of the facility would be small. Components of the facility that could have the potential to interact with the groundwater system include the surface water detention basin, the two planned septic systems with leach fields, and onsite vehicle fuel. Facility design and operating procedures would minimize the possibility that contaminants would enter the hydrologic environment.

Impacts to groundwater from surface infiltration at the storm water detention basin or from the shallow septic systems depend on: (1) whether the volume of infiltration causes saturated flow to the water table or is absorbed in the vadose zone, (2) whether the constituents dissolved in the water, and (3) the ability of the soil to attenuate the migration of dissolved constituents.

The detention basin would be constructed with compacted soil sideslopes and floor. The storm water detention basin will be a 3-ha (8-acre) basin with 10 **:** 1 (horizontal : vertical) embankments with crested wheatgrass vegetative cover. PFS estimates that the percolation rate for water in the basin would be 2.6 X 10^{-6} cm/s (0.09 inch/day) which is a significantly lower rate than the estimated percolation rate for underlying soils or the estimated groundwater seepage rate beneath the site (see Sect 3.2.2). Since the estimated seepage rate for water through the detention basin floor is much less than the estimated percolation rate for water in site soils it is unlikely that saturated flow conditions will occur during infiltration unless there is degradation of the compacted soil layer or groundwater perching zones exist beneath the detention basin. If processes such as frost heave or vegetation root penetration cause disruption of the compacted soil layer, increasing its permeability, the seepage rate through the floor and sideslopes of the detention basin could increase. If perching of groundwater occurs beneath the site, lateral seepage could occur in the interbedded silts and silty clays allowing groundwater to migrate to natural or man-made preferential seepage pathways. Natural preferential seepage pathways could include buried dessication cracks in the subsurface soils and man-made pathways could include abandoned geotechnical borings beneath the site. The nearest identified exploratory boring to the detention basin floor is approximately 60 m (200 ft) to the south (upslope).

Surface water runoff from throughout the restricted area would enter the detention basin. The runoff would originate on the spent fuel storage pads, from building roof drains at the canister transfer building and the security and health physics building, and from general area runoff including the rail yard area. The drainage channels leading to the detention basin would be unlined but would contain erosion control structures. It is expected that water from small runoff events would percolate into soils beneath the drainage channels and that larger runoff events would carry surface flow to the detention basin. The runoff water would carry any soluble materials from the outside surfaces of the fuel storage casks, the pad surface, the building surfaces, soluble materials in surface soils, and any loose particulate materials such as soil particles and any windblown vegetation debris. The spent fuel storage containers are not expected to be a source of radiological contamination because of container integrity certification requirements and decontamination procedures required prior to shipping from the originating reactor sites. The water quality of runoff that would enter the detention basin is expected to be similar to that from urban or industrial facilities in the region.

PFS does not expect the detention basin to contain water except after severe storms. Protection of soils and groundwater beneath the detention basin from contamination depends on the fact that (1) the SNF storage canisters are sealed by welding that precludes leakage of any radioactive material, (2) measures are applied at the originating nuclear plants when fuel is loaded into the canisters to prevent outside contamination, (3) the canisters may not be shipped to the PFSF unless they are free from surface contamination, (4) PFS staff will perform a receipt survey to verify that the canisters are free from surface contamination, and (5) after loading of canisters into storage casks at the PFSF, the storage casks will be surveyed to verify that no surface contamination is present. Further, the PFS "start clean/stay clean" philosophy will require PFS to reject and return any canisters with external contamination. However, PFS has a commitment to sample and analyze water in the detention basin when freestanding water is present to determine if radiological contaminants are present (PFS/ER 2001) followed by appropriate treatment actions, such as conformance of any clean-up activities with the standards set forth in 10 CFR Part 20.

PFS has indicated that temporary pumps would be used to remove long-term standing water from the detention basin to prevent stimulating plant growth and attracting wildlife (PFS/RAI2 1999e). Any water pumped from the basin would be distributed to an area located on tribal lands within the lease area just to the north of the proposed detention basin. The area on this side of the basin slopes gently down toward the north and contains no arroyos or natural drainage channels. Distribution of the pumped water could be done in a time-release manner, if necessary, to avoid oversaturation of the receiving soils.

Although the presence of contamination in the detention basin is considered unlikely, in the event that PFS should fail to detect contaminants that are present in infiltrating water, some contamination of underlying soils and groundwater could occur. The extent of such contamination would depend on the type of contamination present and contaminant attenuation capacity of underlying soils. Site-specific soil contaminant attenuation properties are not known for Skull Valley soils. PFS does not propose to monitor groundwater quality at the site. If contamination of soils or groundwater should occur at the detention basin, site cleanup actions would be required to restore the site.

The proposed PFSF would have two septic systems to serve occupied areas of the site. Pursuant to 40 CFR 144.26, Underground Injection Control registration with EPA Region VIII would be required. One of the proposed septic systems system would serve the Administration and Operation and Maintenance Buildings [estimated 2460 liter/day (650 gal/day)] and the other would serve the Canister Transfer and Health Physics Buildings [estimated 1514 liter/day (400 gal/day)]. Both septic systems are designed to use 130 m^2 (1400 ft^2) leach fields. The estimated rate of application of water to the leach fields would be 1.5×10^{-5} to 2.2×10^{-5} cm/sec (0.02 and 0.03 in/hr) which is much lower than the estimated soil percolation rate of 1.4×10^{-4} to 4.2×10^{-4} cm/sec (0.2 to 0.6 in/hr). The leach fields should be able to accept the anticipated water volumes unless subsurface soils have much lower infiltration capacities than estimated. Like the soils beneath the detention basin, improper functioning of a septic system could occur if natural or man-made preferential seepage pathways exist within the seepage field area. In such a case there could be rapid percolation of incompletely treated septic water downward toward or to the groundwater table. The septic systems would be located downslope from the Administration area and the Health Physics Building on the eastern side of the facility.

PFS has committed to implement operational procedures and controls to prevent the introduction of radiological contaminants into the wastewater treatment systems. In addition the facility design does exclude the construction of drains to the wastewater treatment systems from radiological areas. Influent to the septic systems would include water from lunch rooms, janitor closets, and restroom/shower facilities. Drains from areas where radiological materials are present (i.e., in the spent fuel Canister Transfer Building or the Health Physics Building laboratory) would not be connected to the septic systems. The Canister Transfer Building would have a sump to collect any water that may drip from the exterior surface of shipping casks. Any liquid collected in the sumps would be sampled to ensure that it is not contaminated prior to removal and disposal. Any contaminated liquid would be collected, solidified, and disposed as solid LLW offsite. The Health Physics Building laboratory (where dry wipe samples would be subjected to radiological analysis and any liquid samples would be analyzed) would not have a drain. Any liquids found to be contaminated would be solidified for offsite disposal as solid LLW.

Non-radiological chemicals that would be used on site include painting supplies, pesticides, and non-hazardous janitorial cleaning supplies. Such materials are typical of municipal and industrial facilities and would be managed in such a manner as to prevent the introduction of these materials into the wastewater treatment system. Paint waste can be hazardous. Pesticides are hazardous waste (actually universal waste, a subset of hazardous waste). These materials cannot be diluted for disposal, and they cannot be put into the wastewater system. They would be disposed of as hazardous waste and taken to an approved disposal facility by a licensed transporter. It is possible that small quantities of non-hazardous chemicals could be introduced into the wastewater treatment system through equipment cleaning. The biological decomposition of some of these chemicals would minimize the potential for adverse impacts to groundwater via the wastewater treatment systems.

Above-ground fuel tanks would be used at the site to store vehicle fuel. PFS's Best Management Practices Plan should prescribe methods for properly responding to fuel leaks or spills to minimize fire hazard or contamination of groundwater.

4.2.3 The Alternative Site (Site B) in Skull Valley

Under normal conditions, the potential hydrological impacts at Site B in Skull Valley would be small and would be similar to the impacts discussed for use of Site A. There are no distinguishable differences in the surface water or groundwater characteristics of Sites A and B. Both sites have shallow dry washes that carry ephemeral surface water runoff. Since Site B is immediately upslope from Site A some of the same drainage features cross both sites. Assuming that the facility configuration would remain the same on Site B as it would be on Site A, the expected flooding effects would be the similar, although flood heights may be slightly lower at Site B since it is at a slightly higher elevation.

Soil and groundwater conditions are expected to be the same at Site B as they are at Site A and potential impacts expected at Site B would be small.

Above-ground fuel tanks would be used at the site to store vehicle fuel. PFS's Best Management Practices Plan could prescribe methods for properly responding to fuel leaks or spills to minimize fire hazard or contamination of groundwater. To ensure that construction and operational activities will not lead to contamination of groundwater, the Cooperating Agencies propose that PFS be required to implement a BMP including a spill response procedure, and be required to be responsible for clean up of spills or accidents on the facility site in conformance e with applicable standards (see Section 9.4.2).

4.2.4 Mitigation Measures

Several small to moderate impacts related to the hydrologic system at Skull Valley have been described. PFS has identified mitigation measures for some, but not all, of the potential impacts. The following discussion highlights additional mitigation measures that could further reduce potential impacts of construction of the facility.

One potential impact to surface water from construction is related to the construction sequencing for the PFSF. Construction of the southeastern storage pad, and perhaps other upslope facilities, prior to construction of the detention basin (which could be configured as a sedimentation basin during early construction) creates a potential for erosional/depositional impacts in drainage ways downslope of the site during the early periods (weeks) of Phase 1 construction. PFS could reduce this impact if the detention basin was the first feature constructed on the site. All construction area runoff could be routed into the basin to prevent local channel degradation. Accordingly, the Cooperating Agencies recommend that the detention basin be the first feature constructed on the site.

While there is some uncertainty regarding the potential impact of on-site pumping on neighboring water supply wells, PFS could either monitor water levels in adjacent wells or otherwise monitor the effect on area groundwater levels to verify the small impact predicted.

The Cooperating Agencies propose that PFS be required to develop a monitoring program, including one of the methods described above, to determine if the wells nearest the proposed PFSF are adversely impacted from groundwater withdrawal associated with the construction and operation of the proposed PFSF (see Section 9.4.2).

In the event that neighboring groundwater users were adversely affected, the Cooperating Agencies recommend that PFS mitigate this impact by exercising the option of using an existing supply well located approximately 4 km (2.5 miles) to the east of the site or construct wells in a higher yield portion of the aquifer.

4.3 Air Quality

This section discusses impacts from site preparation and construction of the PFSF. It also includes an assessment of potential air quality impacts in the context of NAAQS (40 CFR Part 50). The NAAQS were established to protect human health and welfare with an adequate margin of safety (40 CFR Part 50). The greatest expected air quality impacts would involve airborne particulate matter arising from the extensive earthwork involved in site preparation and construction. Existing literature provides estimates of construction-related particulate emissions in terms of mass generated per unit area per unit time. Emissions from earth disturbance and from exposed loose dust during hours when earth disturbance would not occur were included in the analysis; emissions from construction vehicles and from a concrete batch plant located within the proposed facility during the construction period were also included. Emissions parameters were input into standard Gaussian air dispersion models that provide estimates of increases in atmospheric concentrations (mass per unit volume) of contaminants at various distances from the site of the proposed PFSF. The EPA-recommended pollutant dispersion model, ISCST3, was used. Modeled increases in particulate concentrations have been added to measurements of existing background concentrations in the region (as taken from data available on EPA's web site), and the sums have been compared to NAAQS (40 CFR Part 50) to check for particulate concentrations resulting from the proposed construction activities potentially exceeding the standards. A similar evaluation has been performed for construction activities associated with the proposed Skunk Ridge rail route and the ITF near Timpie (see Section 5.3.1).

Air emissions associated with routine operations are evaluated separately in Section 4.3.2 of this FEIS.

4.3.1 Construction Impacts at the Preferred Site (Site A)

During construction of the proposed PFSF, temporary and localized increases in atmospheric concentrations of nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), volatile organic compounds (VOCs), and particulate matter would result from exhaust emissions of workers' vehicles, heavy construction vehicles, diesel generators, and other machinery and tools. Because a maximum of 10 equipment operators are expected to be on site at any one time (PFS/ER 2001), emissions from construction-related equipment are expected to be small. However, due to the large extent of the disturbed area, particulate matter in the form of fugitive dust emitted from excavation and earthwork could lead to appreciable local increases in atmospheric concentrations of particulate matter less than 10 microns in diameter (PM-10), as described below. Fugitive dust would have the greatest influence on air quality during construction.

Estimates of PM-10 concentrations from construction-related fugitive dust originating at the proposed PFSF site were obtained from air-dispersion modeling, and were added to existing (background) concentrations to obtain estimates of total airborne PM-10 concentration for comparisons with the NAAQS.

To obtain upper-bound estimates of construction-related PM-10 concentrations, the EPA-recommended Industrial Source Complex Short-Term (ISCST) air dispersion model (EPA 1995) was applied to an assumed construction area of maximum extent. This area totaled 30 ha (75 acres), and included: the entire detention basin, the southwestern portion of the diversion berm, the southeastern pad area, all but the northwest portion of the boundary area, the health physics building, the canister transfer building, and the concrete batch plant. This configuration was chosen to represent a maximum area that would likely be undergoing heavy construction at any single time; it is unlikely that any realistic construction area would produce higher PM-10 concentrations in any direction from Site A.

On the basis of EPA-recommended data (EPA 1988), an average emission factor of 1.02 g/ha/s (1.2 tons/acre/mo) of total suspended particulate was used to calculate fugitive dust emissions. Of these emissions, 30 percent of the mass is expected to consist of PM-10 (Kinsey and Cowherd 1992). Because PFS has stated that sprinkling of water would be performed during construction to control dust (PFS/ER 2001), fugitive dust emissions were reduced in the model by 50 percent (EPA 1985, 1988). However, no such emission reductions were assumed for the concrete batch plant or for loose dirt subject to wind erosion during off hours.

Construction was assumed to occur continuously during a normal 9-hour shift (8:00 A.M. to 5:00 P.M. each day). The modeled PM-10 concentrations during construction were added to the background concentrations given in Table 3.2 to estimate total impacts for comparison with the NAAQS; however, it should be noted that the background PM-10 concentrations given in Table 3.2 were obtained from Magna, which is well to the northeast of the proposed PFSF site (see Figure 1.1). Therefore, the impacts from some large existing PM-10 sources within 50 km (32 miles) of the site, and particularly sources to the southwest of the site (e.g., Dugway Proving Ground), would not be fully represented in the background data from Magna. To account for this, the effects of emissions from other large sources in the area (e.g., Dugway Proving Ground, Tooele Army Depot) on concentrations near the site of the proposed PFSF were included in the modeling without any compensation for obstructions that exist, such as mountain ranges between these other sources and the proposed PFSF site. These results were added to the background concentrations obtained from the air quality monitoring data at Magna to provide a conservative estimate for background.

Eight years (1984–1991) of Salt Lake City meteorological data (available from EPA at URL http://www.epa.gov/ttn/scram/t25/htm) were used in the modeling. Salt Lake City is the nearest location at which quality-assured hourly meteorological data have been archived over a period of several years. The two years (1997 and 1998) of meteorological data from near the Pony Express convenience store located on Skull Valley Road about 3.2 km (2 miles) southeast of Site A were also used, providing a total of 10 years of meteorological data; results from the two meteorological monitoring sites were similar to each other.

Atmospheric concentrations of PM-10 were modeled at 125 locations (receptors) within 3.5 km (2.2 miles) of the center of the proposed storage-pad area but outside the immediate area of the proposed facility. The outermost circle of receptors passes close to the nearest residences; no locations closer to the proposed PFSF were identified as places where a member of the general public would likely spend appreciable fractions of any given day. The innermost circle of receptors passes close to the nearest publicly-owned land, about 1,100 m (0.7 mi) northeast of the center of the proposed PFSF.

Table 4.2 shows the results of the above analysis. Construction of the proposed facility is not expected to lead to any exceedances of NAAQS for PM-10 at the nearest residences, even if construction activity is as intensive as that assumed in the modeling. Moreover, the modeled contribution of construction activities to total PM-10 concentrations is small compared to the background concentration values.

Table 4.2. Effects of site construction on PM-10 concentrations at the nearest residences

	Contribution to PM-10 concentration (as modeled)				
Averaging period	**Construction**	**Background[a]**	**Total modeled concentration**	**NAAQS**	**Total modeled concentration as percent of NAAQS**
24-hour	24 μg/m^3	92 μg/m^3	116 μg/m^3	150 μg/m^3	77
Annual	2 μg/m^3	22 μg/m^3	24 μg/m^3	50 μg/m^3	48

[a]The modeled effect of PM-10 emissions from Dugway Proving Ground is included.

The highest 24-hour average concentration expected at the location of the nearest residence due to the combined influences of modeled background sources and site construction is 116 μg/m^3. The modeled contribution of off-site sources was minuscule (i.e., less than 0.1 μg/m^3) due to the absence of large PM-10 sources, other than site construction, in the upwind direction on days when the wind is transporting PM-10 from the construction site toward the nearest residence. Therefore, the maximum modeled 24-hour PM-10 concentrations at the nearest residence almost exclusively originate from disturbance at Site A. Because NAAQS would not be exceeded at the nearest residence, the expected air quality impacts from the preparation and construction of Site A would be small.

4.3.2 Impacts During Operations at the Preferred Site

The proposed PFSF would not be a "major stationary source" of air emission as defined in 40 CFR 52.21(b) or a significant air emission source under 40 CFR 51.166(b)(23)(i). Emissions from daily operations of the proposed facility would arise primarily from (1) a switchyard locomotive; (2) a small emergency generator, vehicles for transportation of material within Skull Valley, guard and security patrol vehicles, commuter traffic; and (3) space-heating furnaces.

Operational emissions would be intermittent and would not be expected to contribute to an exceedance of any ambient air quality standard. Facility operations would not result in air emissions of sufficient magnitude to warrant analysis for permits for New Source Performance Standards or Prevention of Significant Deterioration (PSD) under the CAA. The staff has reached these conclusions based on the following considerations.

- The space heating units at the proposed PFSF would use less than one million Btu per hour heat input and, therefore, would be small enough to be exempt from air quality regulations.

- The emergency diesel generators for the proposed PFSF would have a capacity less than 150 kW and would not be operating more than 250 hours per year. Such generators are not large enough to require analysis for compliance with New Source Performance Standards or Prevention of Significant Deterioration.

- To the extent that the concrete batch plant would be operating during the lifetime of the proposed PFSF, its expected PM-10 emissions would be about 3.2 tons per year. Under 40 CFR 52.21, the threshold for classification of a source as a major stationary source is 250 tons per year. Under 40 CFR 51.166, the threshold for a significant increase in PM-10 emissions is 15 tons per year.

- Mobile sources (e.g., heavy-haul trucks, commuter vehicles, etc.) are not subject to the regulations applicable to stationary sources in areas that are in attainment of the NAAQS.

- Even if they were to be combined into a single source, sources of air emissions from operation of the proposed PFSF would not be expected to exceed the significance levels for PSD analysis given in 40 CFR 51.166(b)(23)(i).

4.3.3 The Alternative Site (Site B) in Skull Valley

With respect to the potential for impacts to air quality, there is no clearly distinguishable difference between the preferred site (Site A) and the alternative site (Site B) on the Reservation. While Site B is slightly closer than Site A to the nearest residences, the highest construction-related PM-10 concentrations at those residences would be slightly less than for Site A. This is because the worst dispersion conditions when the wind is moving toward those residences from Site B are not as unfavorable as when the wind is from the direction of Site A.

4.3.4 Mitigation Measures

Sprinkling the disturbed area with water to reduce fugitive dust is one of the most effective means of reducing construction-related emissions. The need to control these emissions has already been accounted for in the construction planning and in the foregoing analysis. In addition, operation of construction equipment and related vehicles with standard pollution control devices and maintenance of this equipment in good working order would minimize emissions from these sources. Other methods of minimizing the potential impacts from dust emissions include covering material in trucks and washing trucks frequently, designating personnel to monitor dust emissions and to order increased surface watering as necessary, and minimizing dust emissions from the concrete batch plant through the use of water sprays and/or shrouding or enclosing material transfer points and aggregate storage piles. The Cooperating Agencies propose that PFS be required to develop a program to control fugitive dust during construction that includes one or more of the methods described above, as appropriate, to control and reduce construction related emissions (see Section 9.4.2).

4.4 Ecological Resources

The potential impacts of site preparation, construction, and operation on ecological resources are evaluated and discussed in this section. Areas of potential concern include construction and operation activities that would disturb or remove vegetation or animals either temporarily or permanently. Since the existing drainages in the area of the preferred site are ephemeral and support no permanent aquatic communities, construction activities would have negligible direct and indirect impacts on aquatic biota, and they are, thus, not considered in this section. Direct losses from land disturbance are quantified by determining the amounts of habitat lost as a result of construction activities. Potential impacts on species of special concern, as identified in Section 3.4.3, that are found to reside on or use the proposed site are also evaluated in Section 4.4.3.

4.4.1 Construction Impacts at the Preferred Site (Site A)

Table 2.4 shows the amount of land that would be cleared for the proposed PFSF. The OCA for the proposed PFSF (only part of which would be cleared) would consist of about 330 ha (820 acres), which is less than 0.3 percent of Skull Valley's approximately 108,400 ha (271,000 acres). PFS proposes to use herbicides to maintain the 40-ha (99-acre) restricted-access area clear of vegetation. The impacts of using herbicides during operation of the proposed PFSF are addressed in Section 4.4.2.

4.4.1.1 Vegetation

Direct impacts on vegetation of constructing the facility (including the access road) at the preferred site would include removing existing vegetation, replacing some of it for the life of the project with structures and ancillary facilities such as the access road, and replanting other parts of the disturbed areas with some mixture of native and non-native plant species. Direct impacts to soil, which would include the biological soil crust if present (see Section 3.4.1.1), are described in Section 4.1.1. The direct impact of clearing vegetation and disturbing the biological soil crust for the proposed action would be small, as the area to be cleared for the life of the project at the preferred site contains no unique habitats and amounts to less than 0.1 percent of the land area of Skull Valley. Planting native species on those areas to be cleared that are currently dominated by cheatgrass would have a beneficial impact on vegetation and biodiversity; but this impact would be small in relation to the entire area of Skull Valley.

Indirect effects on vegetation of constructing the facility (including the access road) at the preferred site would include modifying wildlife habitat and introducing a non-native species, crested wheatgrass (*Agropyron cristatum)*, as a fire barrier, thus reducing the susceptibility of the area to wildfires. In addition, ground water withdrawal, fugitive dust from construction, and movement of large trucks could have indirect effects on vegetation and the biological soil crust. These impacts would all be small.

Construction of the proposed PFSF at the preferred site, including the access road, would require clearing vegetation and grading soil from approximately 94 ha (232 acres) of desert shrub/saltbush vegetation community within the 330-ha (820-acre) OCA and the 82-ha (203 acre) access road right-of-way. Most of the vegetation that would be cleared is dominated by non-native species such as cheatgrass (see Section 3.4.1). About 57 ha (140 acres) would remain cleared for the life of the proposed PFSF.

PFS has stated that it would revegetate approximately 37 ha (92 acres) after construction. The approximately 28-ha (68-acre) fire barrier would be planted with crested wheatgrass, and the remaining cleared area [about 9 ha (24 acres)] would be planted with native species. The revegetation plan for the PFSF site would be developed during construction in consultation with the Skull Valley Band and BIA (PFS/RAI2 1999). It would include monitoring during the life of the facility to ensure successful vegetation establishment. [See Section 4.4.5 for a discussion of mitigation measures (e.g., irrigation) to ensure success of the revegetation program.]

Subdividing large areas dominated by annuals such as cheatgrass by planting less flammable species in borders or greenstrips can help both to contain large fires and to aid in fire suppression. Because fires currently spread rapidly through Skull Valley due to the extensive amounts of cheatgrass growing there, the use of crested wheatgrass as a fire barrier might act to reduce the extent of fires.

Crested wheatgrass, which PFS is planning to plant in a strip around the proposed facility as a fire barrier, is a native of east and central Asia where it evolved with extensive grazing. It has been widely planted in the United States and is often used in the Intermountain Region for revegetating disturbed lands (Ahlernslager 1988; Harrison et al. 1996). It is considered to be fire resistant because observers have reported that wildfires move only two to three meters (a few feet) into an area seeded with it (Ahlernslager 1988). While the plants burn quickly, they are only slightly damaged by fire and recover quickly. However, the response to fire varies with the season and intensity of the burn. The species is tolerant of fire when dormant, and several studies have shown that its growth is enhanced by late summer and fall fires.

When used in revegetation, crested wheatgrass is typically seeded alone and is one of the easiest and most successful grasses to establish on semiarid rangeland sites (Ahlernslager 1988; Harrison et al. 1996). This species has been grown in the western United States since the early 1900s and is considered by some to be semi-naturalized (Harrison et al. 1996). In Utah it grows on disturbed or revegetated sites along roads and on open slopes in salt desert shrub to ponderosa pine communities (Albee et al. 1988). It is an excellent seed producer that in many instances spreads readily by seed and is capable in some places of invading surrounding habitats.

Although it provides permanent, self-sustaining vegetation, the use of crested wheatgrass has generated controversy (Christian and Wilson 1999). The relative stability of monocultures of crested wheatgrass can retard the succession of native vegetation and result in a loss of wildlife habitat in areas seeded totally in this one species. While in some parts of the western United States it has spread outside the area where it was planted, in other places it has not spread or out-competed native species, and in some cases plantings of crested wheatgrass have been repopulated by native species such as big sagebrush and rabbitbrush (Harrison et al. 1996).

Revegetation with native species would have a small positive impact on vegetation, while planting a fire barrier with crested wheatgrass would replace an area dominated primarily by one non-native species with another non-native species. Planting crested wheatgrass would have a small impact on vegetation because it is no more invasive than the cheatgrass already there; it resists cheatgrass competition better than many other species, and it provides some protection from fire that may occur in the area. Mitigation measures that would result in a larger positive impact from revegetation are discussed in Section 4.4.5.

Withdrawal of groundwater to support construction of the facility would have a small impact on vegetation. (See Section 4.1.2 for a discussion of groundwater use for the proposed facility.) Plants from arid environments tend to have deeper roots than those growing in other ecosystems; the maximum average rooting depth for vegetation in the desert biome has been reported to be 9.5 ± 2.4 m (31 ± 8 ft) (Canadell et al. 1996). The depth to the perennial water table in Skull Valley is about 38 m (125 ft) (Section 3.2.2), much deeper than plant roots usually grow. Thus, withdrawing groundwater for the proposed facility would have a small impact on vegetation.

Surface water runoff from the restricted-access area (discussed in Section 4.2.1) would be routed to a detention pond. Thus, there would be only a small impact to vegetation in the surrounding undisturbed habitats from runoff from impermeable surfaces constructed within the project area.

Fugitive dust would be generated during construction, as discussed in Section 4.3.1. The small, short-term, incremental amount of the dust that would be generated from construction activities is expected to only have a small impact on vegetation since vegetation in arid environments is not sensitive to dust.

4.4.1.2 Wildlife

The proposed construction activities would result in the temporary disturbance of 94 ha (232 acres) and the permanent disturbance of 57 ha (140 acres) of desert shrub/saltbush ecosystem. This disturbance would reduce habitats for wildlife species such as jack rabbits, small mammals, and birds. Certain species such as mule deer and pronghorn antelope may be forced to change their movement patterns due to the presence of the restricted-access area fence. As discussed below, all of these potential impacts are expected to be small.

During construction, wildlife, such as ground squirrels, kangaroo mice, and small reptiles could be displaced or lost due to the excavation of soils. There would be a loss of nest sites for certain species of birds and burrow sites for species such as the Skull Valley pocket gopher and burrowing owl. This reduction of animals and wildlife habitat would have a small negative impact on the abundance of prey for predatory species, such as hawks, eagles, owls, and fox species. In addition, along some of the proposed roads and the edges of construction areas, the soils may be loosened in such a way that habitat for burrowing mammals and owls might be created. Overall, the permanently disturbed area is expected to have only a small negative impact, as less than 0.1 percent of Skull Valley would be disturbed due to the construction of the proposed facility.

The revegetation of 37 ha (92 acres) would create a small amount of improved wildlife habitat. These areas may provide habitat for burrowing owl, gopher, and small mammals and may also support some prey species and help replace those lost or displaced by construction. The crested wheatgrass fire barrier may supply resources for some wildlife species. Many wildlife species eat crested wheatgrass, and some prefer it to native grasses (Ahlenslager 1988; Harrison et al. 1996). It supplies quality green forage on many ranges in the fall and during snow-free periods of the winter when native species are either dormant or produce little foliage, thereby extending the availability of browse areas. Crested wheatgrass starts growth earlier in the spring than most other range species and provides a high-quality forage that helps wildlife rapidly recover body condition after the stressful winter period. Small areas planted in crested wheatgrass often attract birds. Upland game birds seek crested wheatgrass stands for food, cover, and nesting. The removal of sagebrush displaces shrub-nesting bird species, but the seeding of perennial grasses such as crested wheatgrass provides more habitat for some ground-nesting bird species.

Currently there is a livestock fence on the northern and western borders of the Reservation. The proposed action calls for the fencing of the OCA [approximately 330 ha (820 acres)]. This fence would be a typical range fence of approximately 1.2 m (4 ft) high and would not inhibit the movement of wildlife species. Only approximately 40 ha (99 acres) of this area (i.e., the restricted-access area) would be fenced in a manner that would restrict wildlife movement. Wildlife use of and movement through the restricted-access area would be limited, and the presence of the facility may inhibit the movement of range wildlife such as mule deer and pronghorn antelope. Some wildlife would have to change their movement patterns to negotiate around the restricted-access area fences. This should not have a significant impact on mule deer or pronghorn antelope populations as the western portions of the Reservation (i.e., areas to the west of Skull Valley Road) have not been identified as critical fawning or wintering areas for either species (BLM 1988a). The closest critical habitats for pronghorn antelope can be found to the north of the proposed PFSF, 10 km (6 miles) northwest of Delle [about 40 km (25 miles) from the proposed site] and to the south of the proposed PFSF, approximately 40 km (25 miles) south of the Reservation. Critical mule deer habitat is present to the east of Skull Valley Road and is shown on Figure 3.7. The range fence around the OCA would restrict the movement of cattle. However cattle would be permitted to graze within this area at the discretion of the Skull Valley Band, the BIA and PFS.

The access road between Skull Valley Road and the proposed facility would not be fenced. The proposed fence nearest to Skull Valley Road would be around the OCA at a distance of 3 km (2 miles) away. Because the access road would not be fenced, there would be no forced changes to wildlife movement patterns near Skull Valley Road.

Noise impacts from construction would have a temporary adverse effect on area wildlife. This effect is expected to be small, as wildlife sensitive to noise intrusions are those which are nesting or raising young. The area in the vicinity of the proposed PFSF construction does not provide good nesting sites for raptorial birds or critical wintering or fawning areas for deer or antelope (BLM 1988a; UDWR 1997a). Smaller mammals and birds may be affected temporarily, but many of these animals, such as burrowing owls, frequently can adapt to human activity.

4.4.1.3 Wetlands

Because there are no wetlands on or near the preferred site for the proposed PFSF, there would be no direct impacts to wetlands from construction. The only other potential impact to wetlands would be from increased recreational use of the area in the northern part of Skull Valley around Horseshoe Springs by construction workers and their families. This impact should be small (see Section 4.8.3).

4.4.2 Impacts During Operations at the Preferred Site

4.4.2.1 Vegetation

Direct and indirect impacts of operation of the proposed PFSF on vegetation should be small. During operation of the proposed PFSF, no additional disturbance of soils or vegetation would occur beyond that discussed above for construction of the proposed PFSF. Hence, no further direct impacts from the disturbance of soils or vegetation should occur.

Indirect impacts to vegetation during operation of the proposed PFSF could result from air emissions and groundwater withdrawal. During the operational lifetime of the proposed PFSF, only minor atmospheric emissions would be expected (see Section 4.3.2). These emissions would be at levels unlikely to impact vegetation. Groundwater use for the proposed PFSF is discussed in Section 4.2. The level from which groundwater would be drawn by wells is much below the area where plant roots would reach. Thus, withdrawal of groundwater during operation of the proposed PFSF should not impact vegetation.

PFS has indicated that it may use herbicides to assist in maintaining the restricted-access area free of vegetation. EPA's requirements [as mandated by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 USC 136)] control when and under what conditions herbicides can be applied, mixed, stored, loaded, or used (e.g., wind speed, relative humidity, air temperature, chemical persistence, time since last rainfall). By following these requirements, PFS would ensure that the impact of herbicides on non-target vegetation during the operational lifetime of the facility would be small. Similarly, the impact of herbicides on wildlife and water resources during the operational lifetime of the facility would be small.

4.4.2.2 Wildlife

The proposed operation of the PFSF would result in a number of potential impacts to wildlife. Roaming animals may need to adjust their movements and migration patterns from time to time due to the increase in traffic in the area. Wildlife may be attracted to the storage casks, buildings, landscaping plants and trees, power lines and poles, and light posts of the facility. Birds, mammals, and reptiles may be attracted to the cask storage area, as this area will be warmer than the ambient air in the winter. Birds may be attracted to the facilities including the cask storage area for perching and potential nesting because of the limited perching and nesting sites now available in the vicinity. In all these cases, with the application of proper mitigation measures as discussed below in Section 4.4.5, impacts to wildlife populations are predicted to be small.

As part of the construction of the proposed PFSF, long stretches of power lines and poles would be built to connect the proposed site with existing electrical service along Skull Valley Road. The longest proposed stretch would follow the approximately 4-km (2.5-mile) long access road that would connect Skull Valley Road to the proposed PFSF. The new power line poles could be attractive to raptors as perching sites and could, therefore, pose a threat of electrocution to large raptors such as hawks and eagles. Collisions with the power lines could also affect birds. The new power lines and power poles should be designed in such a manner as to minimize or avoid these types of impacts, including the proper application of accepted raptor protection practices (see Section 4.4.5). If these measures are used, the impact on birds would be expected to be small.

During the operation of the proposed PFSF, because construction activities would be for the most part completed, minor impacts from on-site transportation would be expected. Truck traffic could cause roaming wildlife to sometimes adjust their movements and migration patterns. However, these impacts are expected to be minor.

Exposure to ionizing electromagnetic radiation would produce a radiation dose at the perimeter of the proposed Skull Valley facility. When an animal is exposed to such radiation, the radiation may interact with body tissue, or it may pass entirely through the animal (Wicker and Schultz 1982). If such radiation does interact with body tissue, it will deposit the energy it possesses, and eventually this energy will be expressed as heat. In the process, water molecules will be ionized, and OH radicals produced. These radicals would be the cause of most of the radiation damage. In contrast to electromagnetic radiation, a radioactive particulate is a real substance that can be measured in grams. Sources of particle radiation often contain many radioactive atoms (called radionuclides). When ingested, some of these radionuclides will decay while the particulate source is still within the body. These decays will result in the production of energy, and the eventual formation of OH radicals. Only in the case when an animal has ingested a radioactive particle is it possible for a second animal that eats the first animal to concentrate (i.e., bioaccumulate) radionuclides. Because there would be no releases of radioactive particles (i.e., either as solid, liquid, or gaseous effluents) from the proposed Skull Valley facility (PFS/RAI1 1999) (see Section 4.7.2.1), animals living and feeding around the storage casks would not ingest radioactive particles, and bioaccumulation would not occur. Accordingly, the following discussion evaluates only the direct impacts to animals from exposure to ionizining radiation emitted from the SNF inside the storage casks at the proposed PFSF.

During the operations of the proposed PFSF, measurable radiation (but not radioactive effluents) would be present in and around the storage cask area. Doses have been estimated for the HI-STORM storage cask system at the boundary of the restricted-access area (see Table 7.3-7 in PFS/SAR 2001). Assuming that the storage cask area is at maximum capacity (i.e., 4,000 casks present), the radiation doses for the system should pose no threat to wildlife using the habitats adjacent to the fence. Under a maximum exposure scenario of 24 hours a day for 365 days a year, doses to wildlife at the fence around the northern boundary of the restricted-access area would be 0.148 Sv/yr (14.8 rem/yr) for the HI-STORM system. NRC has no standard for radiation doses to wildlife. PFS has established a radiation dose criterion of 1 Sv/yr (100 rem/yr) which it believes is adequate to protect wildlife (PFS/RAI1 1999). The 1 Sv/yr (100 rem/yr) rate is the lowest dose rate at which harmful effects (e.g., impairment of cell development and growth) of chronic irradiation have been reliably observed in several species (Ross 1992; NBS 1994). The International Atomic Energy Agency (IAEA) reports that for mammals, 10 mGy/day (1 rad/day) represents the threshold at which slight effects of radiation become apparent in those attributes (e.g., reproductive capacity) which are of importance for the maintenance of the population. For birds, the IAEA reports that it is more difficult to study the chronic effects of radiation because of their mobility. The IAEA reports that a study showed that the breeding of swallows and wrens exposed to 0.7 to 6 mGy/day (70 to 600 mrad/day) appeared essentially normal (IAEA 1992). The estimated doses to wildlife from operation of the proposed PFSF are well below the PFS and IAEA criteria. Therefore, only small impacts from radiation are expected to wildlife that use habitats near the boundary of the restricted-access area.

Potential impacts to wildlife may occur from exposure to radiation if animals intrude into the storage cask area. Wildlife that could be potentially exposed to radiation from the storage casks include perching birds, nesting birds, birds and mammals seeking warmth and shelter in winter (as the casks will be above-ambient temperatures in winter), and reptiles.

For the HI-STORM cask system, the highest levels of radiation would come from contact with the bottom vents (see Table 4.3). In order for an animal to receive a dose that exceeds the 1 Sv/yr (100 rem/yr) criterion, that animal would have to be in close proximity to the bottom vents 76 percent of the time during the course of a year. This scenario is unlikely. In addition, vents for the proposed storage casks would be covered with appropriately sized wire mesh to discourage wildlife use and habitation of these areas. The already low likelihood of an animal spending enough time near the

Table 4.3. Calculated radiation doses to wildlife from the storage cask array

Location	Dose rate[a] [mSv/hr (mrem/hr)]	Approximate exposure time (in hours per year) required to exceed 1 Sv/yr (100 rem per year)
Bottom vents	0.14 (14)	7,200
Top surface	0.10 (10)	N/A

Note: N/A indicates that exposure for one full year (8,760 hours) will not exceed 1 Sv (100 rem).

[a]Dose rates taken from Table 4.2-2 in PFS/SAR 2001.

vents to receive a dose that exceeds 1 Sv/yr (100 rem/yr) would be decreased further by an active monitoring plan (see Section 4.4.5) to prevent animals from being in the cask storage area. Impacts to wildlife due to radiation exposure via the bottom vents of the casks is therefore predicted to be small. Radiation exposure from the top surface of the HI-STORM storage cask system is low. Even if an animal (e.g., a perching hawk) were to sit on the surface of a cask for an entire year, the doses received by that animal would be 0.9 Sv/yr (90 rem/yr), which is below the 1 Sv/yr (100 rem/yr) criterion. Impacts to wildlife exposed to radiation from the top surface of the HI-STORM cask system are therefore expected to be small.

Nocturnal wildlife species such as nighthawks and bats may forage on insects attracted to the lighting at the proposed PFSF. Wildlife species could also use light poles for nesting platforms. Since these light poles are to be approximately 40 m (130 ft) high, they would be a sufficient distance away from the storage casks to ensure that birds would not be exposed to radiation doses above the 1 Sv/yr (100 rem/yr) criterion. If power poles, 37 m (120 ft) high, are in the vicinity of the cask storage area, birds using these poles as nesting platforms would likewise not be exposed to doses above the 1 Sv/yr (100 rem/yr) criterion. Therefore radiation impacts to animals that may be using the light or power poles in the vicinity of the cask storage area are expected to be small.

4.4.2.3 Wetlands

The area around Horseshoe Springs is a designated ACEC (BLM 1992a). This BLM designation protects and recognizes the unique, environmentally sensitive wetlands and springs found there. Indirect impacts (see Section 4.8.3) to these wetlands could occur if an increased population in Skull Valley over the lifetime of the proposed action results in greater human visitation to Horseshoe Springs and greater use of the informal camping area at Horseshoe Knolls. In 1997 this area had at least 3,475 visitor-use days (BLM 1998c). Only if visitation rose significantly beyond that level might there be a potentially negative impact.

The wetlands habitat around Horseshoe Springs is closed to off-highway vehicle (OHV) use year round (BLM 1992a, 1992b). On areas to the north and south of the wetlands, OHV use is limited to existing roads and trails from April 16 through November 30 and is completely closed to OHV use from December 1 through April 15. These restrictions, if effectively enforced, should protect the wetlands habitat even if an increase in the number of people in Skull Valley during the lifetime of the proposed facility results in increased recreational use of that area. However, as not many workers are projected to move into the valley (see Section 4.5), these impacts would be small.

4.4.3 Impacts to Threatened, Endangered, and Other Species of Special Concern

Section 3.4.3 describes the Federal and State listed threatened and endangered species and other species of special concern that could potentially be affected by the proposed action. Consultation with the FWS has been completed to comply with Section 7 of the Endangered Species Act. On June 30, 2000, the Utah Field Office of the FWS concurred with the “no effect” determination for threatened and endangered species and critical habitat (see the FWS letter in Appendix B).

4.4.3.1 Plants

Direct and other impacts on special concern plant species of constructing and operating the facility (including the access road) at the preferred site would be similar to the general impacts on vegetation discussed in Sections 4.4.1. and 4.4.2. No federally listed threatened or endangered plant species is known to occur in the project area. The only known plant species of concern that might be affected by the proposed facility is the rare Pohl’s milkvetch, which is found to the south of the proposed site (i.e., Site A) (see Section 3.4.3.1). Accordingly, impacts to the Pohl’s milkvetch from construction or operation activities for the project as proposed should be small because it is not located at the proposed PFSF site. Furthermore, PFS has indicated that it will conduct another survey of the site for the Pohl’s milkvetch prior to construction to confirm its original findings.

4.4.3.2 Wildlife

Potential impacts to threatened, endangered, and other species of special concern from the construction and operation of the proposed PFSF are due to loss of habitat. Because the site is not within any critical habitat areas and the maximum amount of land to be cleared is a very small portion of Skull Valley (less than 0.1 percent), impacts due to loss of habitat are predicted to be small.

The construction and operation of the facility would decrease the amount of foraging area by up to a maximum of 94 ha (232 acres) for Federally- and State-listed birds. Because this represents less than 0.1 percent of available habitat in Skull Valley, impacts due to loss of habitat are expected to be small. Furthermore, a portion of this area would be temporarily disturbed, while a total of only 57 ha (140 acres) would be lost for the life of the project.

The loggerhead shrike is a bird that many times can adapt well to certain types of human development. This species may even realize a positive benefit from the proposed project. Shrikes may benefit if barbed wire fences are constructed, thereby creating more points where they could impale their prey.

As discussed in Section 4.4.1.2, nest sites of burrowing owls may be lost due to construction. However, where soil is loosened, some habitat for them may be created.

Mammal habitat would be diminished due to construction of the proposed PFSF. The BLM-listed kit fox may be displaced or forced to change its movement and migration patterns. Skull Valley pocket gophers located on the proposed PFSF site in areas of construction would be displaced or destroyed.

However, since the gophers are widespread in Skull Valley, the population would not be significantly affected even if the individuals in impacted burrows were to be lost (Pritchett 2001). No critical areas for deer, antelope, or fox would be affected by the proposed PFSF, however.

As discussed in Section 4.4.2, one potential source of impact to wildlife is the exposure to radiation from the storage casks. State or Federally listed birds that may use the storage casks as perches, such as ferruginous or Swainson's hawks, would not receive a radiation dose in excess of 1 Sv/yr (100 rem/yr). As set forth above, even if a bird were to sit on the top surface of a cask for an entire year, the dose received would be below the 1 Sv/yr (100 rem/yr) criterion. However, if State or Federally listed mammals or birds spent excessive amounts of time (more than 82 percent) of a year in close proximity to the bottom vents of the storage casks, radiation doses could exceed the 1 Sv/yr (100 rem/yr) criterion. With the implementation of a comprehensive wildlife monitoring plan, this scenario would be unlikely. Therefore, impacts due to radiation exposure from the cask vents to endangered, threatened, and State listed species are expected to be small.

4.4.4 The Alternative Site (Site B) in Skull Valley

The construction and operation of the proposed PFSF at Site B would include the same potential impacts as at the proposed site (i.e., Site A). As discussed in Sections 4.4.1 through 4.4.3, most impacts to vegetation and wildlife at Site B are predicted to be small and similar to those at Site A.

Construction of the PFSF at the alternative site (i.e., Site B) in Skull Valley would require the same amount of vegetation clearing and soil grading as construction at the preferred site (i.e., Site A), as discussed in Section 4.4.1. While the alternative site (Site B) has a somewhat greater diversity of micro-communities, the difference is minor, and construction of the proposed facility on Site B would not significantly reduce the biodiversity found in Skull Valley.

There is, however, a greater potential for impacts, including trampling or habitat destruction, to the rare Pohl's milkvetch (see Sections 3.4.3.1 and 4.4.3) if the facility is constructed at Site B instead of Site A, because Site B is approximately 1.6 km (1 mile) closer than Site A to identified populations of that plant species. In particular, widening or otherwise modifying the road to Hickman Knolls could destroy individuals of the species and/or its habitat. With the possible exception of negative impacts to Pohl's milkvetch, the impacts on vegetation of construction and operation at Site B are expected to be identical to those at Site A.

In regard to wildlife, perennial and intermittent streams, and wetlands, the resources on or near Site B are comparable to those at Site A. Thus, the impacts described above for Site A would apply equally to Site B.

4.4.5 Mitigation Measures

4.4.5.1 Vegetation

The Cooperating Agencies propose that PFS be required to use BMPs listed in Section 9.4.2, during construction of the proposed PFSF which would keep the impacts on vegetation to a minimum.

PFS has proposed to plant crested wheatgrass as a fire barrier. When vegetative fuel breaks are used to reduce the size or frequency of wild fires, they provide protection for soil, water, and other resource values, including the use and perpetuation of native species (BLM 1998a and b). Generally, native species are preferred and should be used where feasible, but the major concern is to maintain ecologically functioning perennial plant communities. Thus, the Cooperating Agencies recommend that species to be used for revegetation be selected for ease of establishment, seedling vigor, and persistence in the community. The Cooperating Agencies also recommend that single species plantings of non-native species on extensive areas be minimized for ecological and utilitarian reasons. Planting a mixture of native species in the fire barrier, such as the seed mix recommended by BLM for the proposed rail line (see Section 5.4.1.1), would have a beneficial impact on the local ecosystem and biodiversity, and the Cooperating Agencies recommend that planting such a mixture be investigated to determine if it is a feasible alternative to planting a monoculture of crested wheatgrass. [Information on fire, its impact on various plants, and possible additional native species to use for a fire barrier is available on the World Wide Web (USDA Forest Service 1996; VegSpac 1999).] The Cooperating Agencies recommend that emphasis be placed on those plants that are best suited for the proposed PFSF site, with species selection made at the local level by qualified personnel on a site-specific basis.

The Cooperating Agencies also recommend the following. The revegetation plan should include careful consideration of the appropriate seed mixes and plants to use, soil conditions, and other measures. In addition, the plan should include a thorough study of site-specific conditions (e.g., elevation, slope, aspect, soil chemistry) and the need for irrigation (see Section 2.1.1.2), seed bed preparation, mulching, and fertilizing to aid in successful site restoration (Holzworth and Brown 1999). Other land uses should be restricted on rehabilitated areas for one to two years to enhance habitat recovery. A preinventory of expected needs and a proactive program of encouraging the collection and storage of native seed should be included. BIA and the Skull Valley Band should be consulted to help identify native species that could meet both goals of providing a fire barrier and increasing biodiversity by improving local ecosystems.

Revegetation with native species would allow the Federal executive agencies to comply with Executive Order (EO) 13112, Invasive Species. This Order requires Federal executive agencies, to the extent practicable and permitted by law, to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species, accurately and reliably monitor invasive species populations, provide for restoration of native species and habitat in ecosystems that have been invaded, conduct research on invasive species, and develop technologies to prevent introduction and to provide for environmentally sound control of invasive species. Therefore, the Cooperating Agencies propose that PFS be required to develop a revegetation plan in consultation with BIA and the Skull Valley Band (see Section 9.4.2). The revegetation plan could include the re-establishment of native species. However, the BIA has selected crested wheatgrass as the preferred species for seeding around the PFSF. Crested wheatgrass can be successfully established easier than native grass and once established, should maintain a successful stand of grass for the entire period of the lease. Crested wheatgrass also will compete better with cheat grass than native grass. This is significant since cheat grass is prone to burn easily and thrives from rangeland fires. In addition, crested wheatgrass is a valuable forage plant for both livestock and wildlife.

The Cooperating Agencies recommend that foot and vehicle traffic be routed away from the known populations of Pohl's milkvetch. Erecting temporary fencing around them during construction to indicate their location would help prevent inadvertent impacts from trampling. In addition, the Cooperating Agencies recommend that a field survey be conducted near the Hickman Knolls Pit (see Section 4.4.3) to search for and identify any additional populations of the species before earth disturbing activities begin. Any populations of this plant that are found should be fenced to protect individuals of this species.

In general, the use of herbicides should be restricted to as small an area as necessary. Herbicides must be applied at the proper stage of plant growth for the best control of noxious weeds (Whitson 1998). In general, care should be taken to ensure that non-target plant species outside the restricted area are not affected. Herbicides must be used in compliance with all applicable laws, including EPA's labeling instructions (40 CFR 156) for prescribed environmental conditions (e.g., wind speed, relative humidity, air temperature, chemical persistence, time since last rainfall). The Cooperating Agencies propose that PFS be required to consult with BIA prior to construction in order to develop an adequate plan for monitoring and controlling noxious weeds during operation of the proposed PFSF (see Section 9.4.2). This proposed consultation should be coordinated with the consultation with BLM regarding the use of herbicides during the operation of the rail line. The plan should include an approved list of herbicides and could consider the use of non-chemical (e.g., biological) means of controlling noxious weeds (BLM 1991), and should incorporate BLM's most recent standard stipulations for chemical treatment (e.g., spraying) of vegetation (see Appendix 5 in BLM 1983).

4.4.5.2 Wildlife

The Cooperating Agencies propose that PFS be required to survey the site of the proposed PFSF and the area within 0.8 km (0.5 mile) of the site prior to construction for burrowing owl and loggerhead shrike nests to ensure that construction activities do not impact nesting birds (see Section 9.4.2). If active nests are present in these areas, construction activities should be curtailed or restricted during the period from April 1 to August 15 (Stone & Webster 1998; UDWR 1997) to avoid any impacts on nesting success and rearing young. Similarly, the Cooperating Agencies propose that PFS be required to survey the site of the proposed PFSF and the area within 0.8 km (0.5 mile) of the site prior to construction for Skull Valley pocket gopher burrows and kit fox dens to minimize the potential for loss of wildlife during construction (see Section 9.4.2).

In order for the BIA to provide appropriate guidance on the above matters, the Cooperating Agencies propose that PFS be required to consult with BIA regarding the appropriate timing of the surveys and to notify BIA immediately if the surveys identify the presence of these species (see Section 9.4.2). In addition, in order to avoid impacts to Federally-listed or endangered species during construction, the Cooperating Agencies propose that PFS be required to notify BIA and cease construction activities immediately if PFS identifies any such species within the proposed PFSF site during construction.

The design of the power transmission poles may have an impact on large perching birds such as eagles or hawks. The power poles that would support the power lines for the proposed PFSF could be designed in such a way (i.e., including wooden perches, insulated wires, etc.) that the potential for electrocution would be greatly diminished. Power poles designed to conform to the "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996" or most recent revision (APLIC 1996) would meet this objective. Given the number of raptors that are known to rest or forage in Skull Valley, the Cooperating Agencies propose this mitigation measure be required (see Section 9.4.2).

PFS proposes to employ facility design features and monitoring and deterrent actions in order to prevent impacts to animals that might gain access to the storage casks. The fence around the 40-ha (99-acre) restricted-access area would be embedded 30 cm (1 ft) into the ground to prevent certain animals from burrowing underneath and gaining access to the storage casks. The fence would be of chain-link design and would be 2.4 m (8 ft) tall to keep larger wildlife from leaping into the area. PFS would monitor for signs of any on-site wildlife activity and would take measures to prevent habitation. This monitoring could employ the use of remote video cameras to limit worker exposure to the cask area. Small mammals and reptiles would also be kept from vents by appropriately sized wire mesh, and from the area by using traps, if necessary. PFS states that the entire facility would be frequently surveyed by workers. If any signs of wildlife habitation were found, actions would be taken immediately to remove the animals. If State or Federally listed species are likely to be taken, BIA would be contacted. The goal of this mitigation measure is to preclude animals from being near the casks for an extended period of time. The Cooperating Agencies propose that PFS be required to develop a monitoring program, consistent with the PFS commitments discussed above, in consultation with NRC, BIA, and the Skull Valley Band (see Section 9.4.2).

4.5 Socioeconomics and Community Resources

This section describes the potential impacts to socioeconomic and community resources, such as population, land use, employment, economy, housing, community services, utilities, schools, etc. A discussion of traffic, particularly along Skull Valley Road, is also included. The potential for workers moving into the area as a result of the proposed action is discussed below.

The existing socioeconomic and community resources in the vicinity of the preferred site (i.e., Site A) for the proposed PFSF are presented in Section 3.5. These resources could be affected either during construction or operation of the proposed PFSF.

Impacts to the socioeconomic and community resources of the Skull Valley Band and their Reservation differ from those to the remainder of Tooele County with respect to such matters as population, land use, and economic structure. The Reservation is not a source of community services, utilities, and schools to the extent that Tooele county is a source of these services. Impacts specific to the Skull Valley Band, as compared to the remainder of Tooele County, are noted in the following discussions as appropriate.

4.5.1 Construction Impacts at the Preferred Site (Site A)

Both the direct and indirect impacts to socioeconomic and community resources during construction of the proposed PFSF are primarily associated with (1) workers who might move into the area and (2) the transport of construction material to the proposed site. The impacts from workers who might move into the area, and the impacts of transporting construction materials are summarized in Table 4.4, and are discussed in the following paragraphs.

The overall approach to the assessment of impacts to socioeconomic and community resources involves the development of an estimate of the number of construction workers who might move into the area. Both the number of direct construction jobs and indirect jobs are considered. These numbers are used to determine the potential increase in the existing population, the demand on local housing, and the number of new children that might be enrolled in the existing school system. These increased numbers of people in the local area serve as the basis for determining impacts to socioeconomics and community resources during all phases of construction. The analytical approach and method are described below.

The proposed PFSF would be constructed in three phases to optimize the resources and schedule required to expedite facility operation and provide continuous local employment for construction of concrete pads and casks (see Section 2.1.1.2). During Phase I, construction would include all the

Table 4.4. Potential impacts to socioeconomic and community resources during the construction of the proposed PFSF

Category of potential impact	Significance level of potential impact
Population	Small
Housing	Small
Educational system	Small
Utilities	Small
Solid waste	Small
Transportation and traffic	Small to moderate
Land use	Small
Economic structure	Small but beneficial

buildings (Administration Building, Operations and Maintenance Building, Security and Health Physics Building, and Canister Transfer Building), the access road, the ITF near Timpie (if transportation from the railroad is to be by heavy haul tractor/trailer), the new rail line from Skunk Ridge (if PFS's preferred option is selected), and the pads within the southeast quadrant of the restricted-access area. The remainder of the restricted-access area would be constructed in Phases II and III. Phase II would include construction of the pads in the southwest quadrant, and Phase III would include construction of the pads in the northern half of the restricted-access area. Completion of Phase II and III would be scheduled to meet the SNF storage needs of nuclear power plants who seek to ship SNF to the PFSF.

Phase I construction of the proposed PFSF would begin upon issuance of an NRC license and would be completed in 18 months. Approximately 130 construction workers would be employed on site during the Phase I construction period, and 43 construction workers would be employed on site during Phases II and III of the construction period. The construction work force required for constructing the two local transportation options (peak of 125 workers for the rail line option or 35 workers for the ITF) are discussed in Chapter 5 and are not included in these totals (see Section 5.4.5). In addition to the jobs that would result directly from facility construction, a number of indirect jobs would be created as a result of the purchases of goods and services by PFS and the construction workers (including purchases by workers at the Pony Express Convenience Store on the Reservation). Based on past experience in similar rural areas (NRC 1996), it can be assumed that each direct job would lead to the creation of 0.5 indirect jobs within the area, for a total of 65 indirect jobs during Phase I and approximately 21 indirect jobs during Phases II and III of the construction period.

Based on worker behavior at similar sites (NRC 1996) and taking into account the relatively small size of the work force and the relative brevity of the construction period, it can be assumed that up to 30 percent of the direct workforce (i.e., approximately 40 workers) could move into the area (i.e., communities in the eastern portions of Tooele County) during Phase I of the construction period. Because many construction workers would probably choose to commute from areas farther away from the proposed PFSF site but within a 60- to 90-minute drive of the site (e.g., Salt Lake City or suburbs of Salt Lake City), it is likely that the actual number of in-moving workers would be substantially less than 40. However, that number is used throughout the following analysis as a reasonable upper bound.

Past experience (NRC 1996) also indicates that approximately 60 percent of in-movers (i.e., 24 workers) would be accompanied by their families, while the remaining 40 percent (16 workers) would come to the area alone. If the in-moving construction workers have an average family size of 2.87, which is the average for Tooele County (Governor's Office of Planning and Budget, Economic and Demographic Projections, 1997; http://www.governor.state.ut.us/dea/rankings/county/hhsizegh.htm), the local population would increase by 85 residents in 40 households due to direct employment. This translates into 16 workers unaccompanied by family, 24 workers accompanied by family, and 45 family members of construction workers.

Indirect jobs generally are less specialized than direct jobs and are more likely to be filled by existing area residents, including residents of Salt Lake City, Provo, and Orem. Accordingly, it can be assumed that only 10 percent of the indirect work force (i.e., seven workers) would move to the area during the construction period. Once again assuming that 60 percent of in-movers (four workers) would bring families and that their average family size would be 2.87, an upper bound of 15 new residents in seven households would be expected as the result of indirect employment.

Combining the above direct and indirect in-migration yields a total of 100 new residents in 47 households as an upper bound. Unaccompanied workers would live in 19 of these households while the other 28 households would consist of workers and their families. Based on the Tooele County average of 0.7 school aged children per household (Governor's Office of Planning and Budget, Economic and Demographic Projections, 1997; http://www.governor.state.ut.us/dea/demographics/household.htm), it is expected that 20 additional children would be added to local schools.

4.5.1.1 Population

Impacts to the population levels of Tooele County are expected to be small. Workers who move into the area during the construction period would probably be distributed in communities in the eastern portion of Tooele County (e.g., Grantsville and Tooele) because they are closest to the proposed project site and have vacant housing units available for rent and sale. It is unlikely that any in-moving workers and their families would locate in Skull Valley itself since there are few, if any, housing units available. It is possible that members of the Skull Valley Band who return to their Reservation for employment at the proposed PFSF might decide to live on the Reservation. At this time it is impossible to accurately estimate the number of Skull Valley Band members living off the Reservation who would move back. Therefore a precise estimation of the impact from an increase in population on the Reservation cannot be made.

The precise distribution of any in-movers would be determined by a number of factors, including proximity to the site and the availability of housing and public services. The 100 new residents used as an upper bound in this analysis would represent an increase of 0.3 percent to the 1996 population of Tooele County. If all of these in-migrants located in either Grantsville or Tooele, the population increase would be 2.0 percent in Grantsville or 0.7 percent in Tooele. While growth of this magnitude could be accommodated without disrupting the affected communities, it is very unlikely that all new residents would settle in a single community. Similarly, while some of the in-movers may be members of the Skull Valley Band who seek to move back to the Reservation, the total number of such persons is not expected to be large due to the limited available vacant housing on the Reservation. However the influx of additional persons onto the Reservation would lead to increased water and utilities usage and waste generation on the Reservation.

4.5.1.2 Housing

Any housing impacts are expected to be small. The 47 new households used as an upper bound in this analysis would represent 13.4 percent of the vacant housing units (not counting housing units in Wendover or Dugway) that were for sale or rent in Tooele County in 1990 (the most recent year for which data are available). Even if all project-induced in-movers settled in either Grantsville or Tooele, which is highly unlikely, it would not exceed the number of vacant units for sale or rent in either of these communities. It should be noted that construction workers would not be permitted to camp on public lands during facility construction, therefore, there would be no impact from construction workers establishing temporary quarters near the proposed PFSF site.

The Skull Valley housing market is isolated by geography, and part of the valley is also isolated by its Reservation status from the rest of Tooele County. The Reservation itself is not a normal housing market. The housing market on the Reservation has the following unique characteristics. Any housing built or placed on the Reservation may be owned only by members of the Skull Valley Band. A Band member seeking to build or place housing on the Reservation must obtain approval from the Skull Valley Band General Council. Any transfer of ownership of a housing structure or a building on the Reservation must also be approved by the Council. The only persons who may reside on the Reservation itself are Band members, spouses of Band members, and their children. The values of existing houses do not include the value of underlying land, which remains in trust for the Skull Valley Band. Housing prices also reflect the strong presence of Federal housing programs. It is not clear whether there is an active housing market on the Reservation.

Impacts on Reservation housing prices would partly depend on whether the proposed PFSF would attract Band members back to the Reservation and partly on the financing mechanisms used to construct housing. If some Band members moved back to the Reservation to take jobs at the proposed PFSF, there might be some increase in demand for housing on the Reservation, but whether returning Band members would simply build new housing, with no effect on the nominal value of existing homes, is not known. In any case, due to the small number of workers expected to move back to the Reservation, the impact on housing prices is expected to be small. Similarly, it is not anticipated that the presence of the proposed facility would deter Band members from moving back to the Reservation, and thereby potentially depress housing prices. It is equally likely that members would move back to be near employment opportunities, as is the case with, for example, nuclear power plants workers. These workers are likely to be more concerned with the ease of commuting to work, rather than potential adverse environmental impacts of the proposed PFSF. In summary, given the above characteristics of the housing market on the Reservation, and the small number of workers expected to move back to the Reservation, the proposed PFSF project would likely have only a small effect on the housing market on the Reservation.

4.5.1.3 Education

The impacts to the education system of Tooele County are expected to be small. The addition of 20 new school-age children would increase enrollment in Tooele County by only 0.25 percent. Even in the highly unlikely event that all in-movers would locate in a single community, the increases in enrollment would be relatively small. For instance, if all new students were enrolled in elementary school in the city of Tooele, there would be an increase of approximately 1 percent. The increase would be 2.7 percent if all new students were enrolled in the Tooele Junior High School, and would be 1.3 percent if all new students were enrolled in the Tooele High School. Similarly, if all the new students were enrolled at schools in Grantsville, the increases would be 2.6 percent in the elementary school, 3.8 percent in the middle school, or 2.5 percent in the high school. It should be noted, however, that the Tooele County School District is already embarked on a significant expansion of its capacity, so that any additional increase may not place demands on the system not already anticipated.

4.5.1.4 Utilities

The addition of 47 new households and 100 new residents is expected to result in small impact to utilities. Most if not all of those in-movers would be expected to occupy currently vacant housing units already connected to utilities (e.g., in Rush Valley or Tooele Valley). As discussed in Section 4.2.1.2, the impacts of constructing the proposed PFSF on water use within Skull Valley, including PFSF impacts to the Skull Valley Band, are expected to be minimal. The only off-site utility infrastructure resource connections to be used at the proposed PFSF are for electrical power and telephone service (PFS/RAI1 1999). For each of these services, new connections would be made from existing lines paralleling Skull Valley Road, and new lines would be constructed along the access road to the proposed PFSF. Construction of the proposed PFSF may require that upgraded electrical service (i.e., reliable, higher voltage electricity) be brought to Skull Valley (PFS/ER 2001), which could be considered a positive benefit.

4.5.1.5 Solid and Sanitary Wastes

Only small impacts are expected from managing solid and sanitary wastes during construction of the proposed PFSF. Excavation and construction debris, as well as removed vegetation and backfill would result from construction of the proposed PFSF. Other than construction debris, which would be transported to a licensed landfill for disposal, other solid wastes would remain on the site and be used for other facility purposes (e.g., building the earthen berm). Sanitary wastes would be managed with conventional systems such as underground sewage (septic) and portable toilet systems.

4.5.1.6 Transportation and Traffic

The impacts during Phase I of construction of the proposed PFSF on Skull Valley Road could be small to moderate. Impacts to other transportation routes (e.g., Interstate 80) should be small. Moreover, the impacts during other construction phases should be less than during Phase I (about 18 months), when most of the equipment and material and the largest number of construction workers would be using Skull Valley Road.

Based upon revisions to the applicant's license application and Environmental Report (PFS/ER 2001), traffic impacts associated with construction of the proposed facility are projected to be less than indicated in the DEIS. Specifically, the amounts of material and water (for dust suppression and soil compaction) to be trucked to the proposed site to support construction of the proposed facility have decreased substantially [from 92,000 m^3 to 41,100 m^3 (from 120,000 yd^3 to 53,600 yd^3) of construction materials and 510 m^3 (135,000 gal) of water per day instead of 680 m^3/day (180,000 gal/day). This includes materials and water needed for construction of the access road from Skull Valley Road to the site of the proposed PFSF site and the access road flood diversion berm, for soil stabilization of the southeast quadrant of the cask storage yard pad area by mixing cement with the upper layer of soil, and initial grading and excavation for the Administration Building and the Operations and Maintenance Building. This reduction in materials and water to be transported results in 150 truck trips per day (75 trucks going each way) instead of the 250 truck trips per day (125 trucks going each way) for the transport of materials indicated in the DEIS and 36 truck shipments per day of water (18 tanker trucks going each way) instead of the 48 truck trips per day of water (24 tanker trucks going each way) indicated in the DEIS during the first period of Phase 1 construction.

This volume of truck traffic on Skull Valley Road has the potential to result in adverse impacts to traffic movement on Skull Valley Road. As noted in Section 3.5, the most recently available traffic data (1995) indicate an average of 325 vehicles per day from the gate at Dugway Proving Ground north to Iosepa and 565 vehicles per day from Iosepa north to Interstate 80. In addition to adverse impacts from increased traffic, there is the potential for increased wear and maintenance requirements for Skull Valley Road due to heavy truck traffic.

In addition to material, equipment, and water deliveries, a peak construction work force of 130 workers would commute to and from the construction site using individual passenger vehicles and light trucks on a daily basis. These workers could account for an increase of 260 vehicles per day on Skull Valley Road during Phase I of construction. All together, construction of the proposed PFSF (during Phase I) could result in an increase of approximately 450 vehicle trips per day on Skull Valley Road. This increase amounts to approximately 130 percent greater use of Skull Valley Road from the proposed site north to Iosepa and an increase of approximately 79 percent from Iosepa north to Interstate 80. This additional traffic volume would lower the Level of Service (LOS) on Skull Valley Road from Level A to Level B, where Level A is the highest quality of service with little or no restriction on maneuverability or speed caused by other traffic, and level B is a zone of stable flow where operating speed is beginning to be affected by other traffic (PFS/ER 2001). This reduction in LOS also results from delivery trucks moving at a slower rate of speed (estimated at 40 mph) than the posted speed limit of 55 mph, requiring other traffic to reduce travel speed or make additional passing maneuvers. Impacts on traffic during subsequent phases and periods of construction would be smaller than during the first period (i.e., the first two months) of Phase 1 construction.

In addition to the truck traffic associated with transporting materials and water during Phase 2 of construction of the PFSF facility, additional construction materials would be transported to the proposed facility to support construction of storage casks. These materials would be transported by truck or rail (using the proposed rail line to be constructed from Skunk Ridge during Phase 1). Assuming construction of 200 casks per year and truck delivery of cask materials along Skull Valley Road, approximately 7,200 m^3 (9,400 yd^3) of material would be required annually, supplied by approximately 520 trucks. Based on construction taking place 9 months per year, with 22 work days per month, about 6 truck trips per day (3 truck trips per day each way) would be required for storage cask construction. Even when added to traffic necessary for Phase 2 construction, [including traffic for transportation of materials, water, and construction workers (43 workers)], and traffic resulting from operations workers (43 workers) (see Section 4.5.2), the total traffic during the peak period of Phase 2 of construction would not result in increased traffic or adversely affect the LOS of Skull Valley Road during Phase 2 of construction.

4.5.1.7 Land Use

The expected impacts for construction are expected to be small. Construction of the proposed PFSF would change the nature of land use within the Reservation. While this change would be qualitatively substantial (i.e., from agricultural to industrial), the land parcel is sufficiently remote and small (when compared to the remainder of the Reservation and surrounding lands) that no quantitatively significant impact would occur.

4.5.1.8 Economic Structure

Because the construction workforce (direct and indirect) would be relatively small compared to the current Tooele County population/workforce and the Phase 1 construction period would be relatively short, the effect of the proposed PFSF on the economic structure of the local area would be small but favorable during the Phase 1 construction period. Impacts during subsequent phases of construction would also be favorable, but even smaller. The unemployment rate in Tooele County could fall slightly due to the potential hiring of current residents and the in-migration of project employees. In addition, impacts to the economic structure of the Skull Valley Band should be proportionately greater, since any construction jobs that might be filled by Skull Valley Band members would constitute a positive impact on the Skull Valley Band economy. Moreover, there would be the potential for increased business at the Pony Express Convenience Store on the Reservation. In addition to construction jobs for Tribal members, the applicant has indicated that training and development opportunities would be available for other Tribal members (PFS/ER 2001).

4.5.2 Impacts During Operations at the Preferred Site

Both the direct and indirect impacts to socioeconomic and community resources during the operational period of the proposed PFSF are primarily associated with workers who might move into the area. These impacts are summarized in Table 4.5, and as discussed in the following paragraphs, would be small.

Table 4.5. Potential impacts to socioeconomic and community resources during the operation of the proposed PFSF

Category of potential impact	Significance level of potential impact
Population	Small
Housing	Small
Educational system	Small
Utilities	Small
Solid waste	Small
Transportation and traffic	Small
Land use	Small
Economic structure	Small but beneficial

As described in Section 4.5.1, the overall approach to the assessment of impacts to socioeconomic and community resources involves the development of an estimate of the number of operations workers that might move into the area. Both the number of direct operations jobs and indirect jobs are considered. These numbers are used to determine the potential increase in the existing population, the demand on local housing, and the number of new children that might be enrolled into the existing school system. These increased numbers of people in the local area serve as the basis for determining impacts to socioeconomic and community resources during the operational period of the facility. The analytical approach and method are described below.

The proposed PFSF would begin commercial operation following completion of Phase I construction and would provide continuous local employment for the duration of its operation. Approximately 43 full-time positions would be required to staff activities during the operational life of the proposed PFSF. Based on past experience in similar rural areas (NRC 1996), it can be assumed that each direct job would lead to the creation of 0.5 indirect jobs within the area, for a total of 21 indirect jobs during operation of the proposed PFSF.

Based on worker behavior at similar sites (NRC 1996) and taking into account the relatively small size of the work force and the duration of the operation period, it can be assumed that all of the direct workforce (i.e., 43 workers) could move to the area (i.e., communities in the eastern portions of Tooele County) during operations. Because many operations workers would probably choose to commute from areas farther away from the proposed site but within a 60- to 90-minute drive of the site (e.g., Salt Lake City or suburbs of Salt Lake City), it is likely that the actual number of in-moving workers would be substantially less than 43. However, that number is used in the following analysis as a reasonable upper bound. In contrast to the case with construction workers, it is assumed that all in-moving operations workers would bring families since the duration of work is essentially permanent. If the in-moving operations workers have an average family size of 2.87, the average family size for Tooele County, the local population would increase by 123 residents in 45 households due to direct employment. This equates to 43 workers accompanied by family, and 80 family members of operations workers.

Indirect jobs generally are less specialized than direct jobs and are more likely to be filled by existing area residents. Accordingly, it can be assumed that only 10 percent of the indirect work force (i.e., two workers) would move to the area during the operations period. Once again assuming that their average family size would be 2.87, an upper bound of six new residents in two households would be expected as a result of indirect employment.

Combining the above direct and indirect in-migration yields a total of 129 new residents in 45 new households as an upper bound. Based on the Tooele County average of 0.7 school aged children per household, it is expected that 32 additional children would be added to local schools.

4.5.2.1 Population

Impacts of facility operations to the population levels of Tooele County are expected to be small. Workers who move into the area during the proposed PFSF's operating period would probably be distributed in communities in the eastern portion of Tooele County (e.g., Grantsville and Tooele) because they are closest to the proposed project site and have vacant housing units available for rent and sale. It is unlikely that any in-moving workers and their families would locate in Skull Valley itself since there are few, if any, housing units available; it is possible that members of the Skull Valley Band who return to their Reservation for employment at the proposed PFSF might decide to live on the Reservation. At this time it is impossible to accurately estimate the number of Skull Valley Band members living off the Reservation who would move back. Therefore any estimation of the impact from an increased population on the Reservation would be speculative. The precise distribution of in-movers would be determined by a number of factors, including proximity to the site and the availability of housing and public services. The 126 new residents used as an upper bound in this analysis would represent an increase of 0.4 percent to the 1996 population of Tooele County. If all of these in-migrants located in either Grantsville or Tooele, the population increase would be 2.5 percent in Grantsville or 0.9 percent in Tooele. While growth of this magnitude could be accommodated without disrupting the affected communities, it is very unlikely that all new residents would settle in a single community.

4.5.2.2 Housing

Impacts of facility operations to the housing conditions are expected to be small. The 45 new households used as an upper bound in this analysis would represent 13.0 percent of the vacant housing units (not counting housing units in Wendover or Dugway) that were for sale or rent in Tooele County in 1990. Even if all project-induced in-movers settled in either Grantsville or Tooele, which is highly unlikely, the number of housing units needed would not exceed the number of vacant units for sale or rent in either of these communities.

4.5.2.3 Education

Impacts of the proposed PFSF operations to the education system are expected to be small. The addition of 32 new school-age children would increase enrollment in Tooele County by only 0.39 percent. Even in the highly unlikely event that all in-movers would locate in a single community, the increases in enrollment would be relatively small. For instance, if all new students were enrolled in elementary school in the city of Tooele, there would be an increase of approximately 1.3 percent. The increase would be 4.4 percent if all new students were enrolled in the Tooele Junior High School, and would be 2.1 percent if all new students were enrolled in the Tooele High School. Similarly, if all the new students were enrolled at schools in Grantsville, the increases would be 4.2 percent in the elementary school, 6.1 percent in the middle school, or 4 percent in the high school. It should be noted, however, that the Tooele County School District is already embarked on a significant expansion of its capacity, so that any additional increase would place demands on the system that may be already anticipated.

4.5.2.4 Utilities

The impacts of operating the proposed PFSF upon utilities are expected to be small. The addition of 45 new households and 129 new residents is not expected to strain existing utilities within the area, since most if not all of those in-movers would be expected to occupy currently vacant housing units already hooked up to utilities (e.g., in Rush Valley or Tooele Valley). The impacts of operating the proposed PFSF itself on water use within Skull Valley, including impacts to the Skull Valley Band, are expected to be minimal and are addressed quantitatively in Section 4.2. Other utilities (e.g., electric power) would be provided to the proposed site during construction.

4.5.2.5 Solid and Sanitary Wastes

Small quantities of solid wastes would be generated during operation of the proposed PFSF radiation surveys. These wastes would be controlled, stored, and disposed in compliance with 10 CFR Part 20. A sanitary drainage system would be constructed at the proposed PFSF to transmit waste from the building to a septic system. Two septic tank and drain field systems would be constructed at the proposed PFSF to collect and process sanitary waste water from the proposed PFSF. The systems would be sized for the maximum number of personnel expected on site during normal operating periods. No adverse impacts are expected from managing sanitary wastes from the proposed PFSF.

4.5.2.6 Transportation and Traffic

Operation of the proposed PFSF would result in small impacts to the local transportation system due to the movement of operations workers commuting each day to the proposed PFSF and due to the movement of fabricated steel liners for the storage casks and the SNF shipping casks to the proposed PFSF. An operations work force of 43 workers would commute each day using individual private vehicles or light trucks. These workers could account for an increase of 86 vehicle trips per day on Skull Valley Road during operations. Using 1995 traffic volume data as the baseline, this increase amounts to approximately 25 percent greater use of Skull Valley Road from the proposed PFSF north to Iosepa and an increase of 14.9 percent from Iosepa north to Interstate 80. This increase in traffic volume due to commuting operations workers (actually a decrease from the volume generated during construction of the proposed PFSF) would not result in any degradation of the LOS on Skull Valley Road. The weekly over-the-road truck shipment of four steel liners for the storage casks should not result in any discernible adverse impact on traffic. The impacts of operating the proposed PFSF on other transportation routes (e.g., Interstate 80) should be negligible.

4.5.2.7 Land Use

Impacts to land use can be characterized as small because the operation of the proposed PFSF would create no additional impacts to land use beyond those discussed in Section 4.5.1 for the construction of the facility. In regard to the UTTR, the NRC staff has met with the U.S. Air Force about the potential for its activities to impact the PFSF and for the PFSF to impact the UTTR or the mission of Hill Air Force Base. The potential for aircraft crashes or other military activity to affect the PFSF is addressed in the NRC staff's SER, as updated, in which it is concluded that these events do not pose a credible hazard to the PFSF. No overflight restrictions are being contemplated to accommodate the proposed PFSF.

4.5.2.8 Economic Structure

Because the operations workforce (direct and indirect) would be relatively small and the operations period would be relatively long, the effect of the proposed project on the economic structure of the local area would be small but favorable and long-lasting. The unemployment rate in Tooele County could fall slightly due to the potential hiring of current residents and the in-migration of project employees. In addition, impacts to the economic structure of the Skull Valley Band should be proportionately greater, since any operations jobs that might be filled by Tribal members would constitute a positive impact on the Skull Valley Band economy. As during the construction period (see Section 4.5.1), there would also be the potential for increased business at the Pony Express Convenience Store on the Reservation.

The Skull Valley Band intends to use lease payments for a number of beneficial purposes, including on-Reservation improvements to housing, development of schools, day-care, medical facilities, higher education opportunities, and commercial improvements to the Pony Express Convenience Store (PFS/RAI1 1999). Additionally, Skull Valley Band members living off the Reservation have expressed an interest in returning if employment and housing conditions improved. The increased revenue to the Skull Valley Band would contribute significantly to the Skull Valley Band's goal of creating a productive homeland for all enrolled members.

Additional impacts on the economic structure of the impact area during the operational life of the proposed PFSF include 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 the PFS's estimate of actual staff 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 the 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 about a 21-year period and shipped over-the-road by truck to the site on the Reservation, where they would be filled with concrete from the batch plant; the 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 sales tax revenues to the State of Utah, estimated to be $53.5 million (based on PFS's review of the Utah tax structure) (PFS/RAI2 1999).

4.5.3 The Alternative Site (Site B) in Skull Valley

The alternative location (i.e., Site B) in Skull Valley for the proposed PFSF is on the Reservation and lies just south of the preferred site (i.e, Site A). Because Site B is very close to Site A, there would be no discernible differences in the anticipated impacts to socioeconomic and community resources during either construction or operation of the proposed PFSF if it were to be located at Site B.

4.5.4 Mitigation Measures

The only socioeconomic and community resource that is potentially adversely affected by construction and operation of the proposed PFSF is increased traffic along Skull Valley Road. This potential exists due to the anticipated increase in the use of Skull Valley Road by construction and operation workers, as well as the movement of construction materials to the Reservation. The potential for adverse impacts to traffic on Skull Valley Road is greatest during Phase I construction (i.e., when approximately 190 truck trips per day would be anticipated). The magnitude of such impacts is discussed above. The Cooperating Agencies recommend that consideration be given to the avoidance or amelioration of these impacts by appropriate scheduling of the proposed PFSF related traffic.

4.6 Cultural Resources

The overall cultural resources setting in Skull Valley is discussed in Section 3.6. This section discusses the potential impacts to the known cultural resources in the project areas. As indicated in Section 3.6.2.1, cultural resources inventories have recently been completed for all proposed action areas in Skull Valley (Birnie and Newsome 2000). The field effort was preceded by a cultural resources overview and literature search, Class I (Bright and Schroedl 1998). The Skull Valley Band has not expressed any concerns about traditional cultural properties being affected. Additionally, during the Section 106 consultation process with regional Federally Recognized Indian Tribes and other organizations, no traditional cultural properties have been identified within the project area (see

Section 1.5.5). The potential for adverse impacts to cultural resources and the need for mitigative activities are discussed below

4.6.1 Construction Impacts at the Preferred Site (Site A)

Based on the results of the intensive field cultural resources survey of the proposed PFSF site, as set forth below, and the Section 106 consultation process (see Section 1.5.5), potential impacts to archaeological and historical resources from construction of the proposed PFSF are considered to be small.

The general environmental setting at this site is such that the potential for locating archaeological or historic properties is low. Site A is located in the center of the valley, exhibits no relief (i.e., no noticeable change in elevation across the proposed site), and is characterized by a vegetative community approximately 70 percent grasses and 30 percent bare ground. No perennial surface water resources are located near the proposed site. A cultural resource inventory of about 400 ha (1,000 acres) for the proposed PFSF area on the Reservation did not encounter any cultural resources properties. However, four isolated artifacts were noted, one in the southeast corner of the proposed PFSF area and three others within the corridor for the east-west access road that would extend from the existing Skull Valley Road to the proposed PFSF (Birnie and Newsome 2000). Two of these isolated occurrences were nondiagnostic stone flakes and two were identifiable early prehistoric projectile points. Because the finds are isolated artifacts and not designated as cultural resources properties, none of these items is considered potentially eligible for listing on the *National Register*. Because these isolated artifacts were all found in areas of soil deflation, there is only minor potential for additional artifacts that are currently buried to be exposed during construction.

However, should buried cultural resources be encountered during the construction phase, the Cooperating Agencies propose to require implementation of specific mitigation measures as described in Section 4.6.5.

4.6.2 Impacts During Operations at the Preferred Site

Normal operation of the proposed PFSF following construction of the transportation route and the PFSF would not be expected to have potential for impacts on archaeological and historical resources since no additional ground disturbance will occur. Similarly, decommissioning activities for the proposed PFSF will take place in previously disturbed areas. Therefore, the overall impact on cultural resources from operation of the proposed PFSF is expected to be small.

4.6.3 Native American Cultural Resources

General issues related to broader cultural values held by some Skull Valley Band members living on the Reservation in proximity to the proposed PFSF have been raised in public scoping meetings and meetings on the DEIS. The proposed action would, in their view, lead to potential impacts on traditional cultural values, such as (1) natural resources (e.g., plants and animals), (2) reverence for the larger area as a cultural landscape, and (3) sacred religious ceremonies.

However, according to the Skull Valley Band Tribal Chairman, no traditional cultural properties or use of culturally important natural resources are known within the specific project areas (PFS/ER 2001). Traditional plants of value to the Skull Valley Band (e.g., sage and cedar) are sparse in the PFS project area due to a lack of surface water, and are considered inferior to the same plants growing in the nearby mountains east of the Reservation and the adjacent Tooele Valley. Natural resources extant at proposed project areas on the Reservation are similar to those found throughout much of the rest of the valley (see Section 4.4). No further information was provided during the public meetings. Additionally, during the Section 106 consultation process with regional Federally Recognized Indian Tribes and other organizations, no traditional cultural properties were identified within the project area (see Section 1.5.5). Further, a thorough review of available ethnographic and historical information revealed no mention of such properties that might be affected.

Consequently, construction and operation of the storage facility on the Reservation is considered to have a small potential for affecting Tribal cultural values or traditional cultural properties. Based on the known situation, no mitigation measures are required for potential impacts to Native American resources.

The Cooperating Agencies recommend that PFS provide appropriate funding to the Skull Valley Band of Goshutes to develop and provide educational materials (e.g., exhibit/brochure/booklet) on the wider context of impacts of European settlement on the pre-contact Skull Valley and the surrounding traditional Goshute lands to be located at appropriate locations (e.g., a proposed Skull Valley Band Cultural Center on the Reservation).

4.6.4 The Alternative Site (Site B) in Skull Valley

The alternative site in Skull Valley (i.e., Site B) is located just south of the preferred site (i.e., Site A), and generally in the same type of environmental setting. The acreage that includes Site B was included in the cultural resources inventory for the proposed PFSF, and findings for the preferred site are applicable at the alternative site. The potential for adverse impacts to cultural resources from construction and operation of the storage facility at the alternative site on the Reservation is small.

4.6.5 Mitigation Measures

In general, land clearing, excavation, and construction activities have the potential to disturb or cause the relocation of cultural data and artifacts. The operation of industrial facilities can degrade the value of traditional sites or uses. In addition, human activity in project areas causes concern that members of the workforce could affect cultural resource sites, especially those at buried locations or with artifacts.

Actions taken to mitigate adverse impacts to cultural resources at the proposed PFSF include those required by law or regulation, as well as those determined by the Cooperating Federal Agencies and the Skull Valley Band to be necessary to reduce or eliminate such impacts. The surface of all project areas where construction activities will occur has been intensively inspected to identify archaeological, historic or other cultural resources that may exist in those areas. The survey and Section 106 consultation process did not identify any cultural resources on the proposed PFSF site.

Buried resources could be encountered during construction. To address these cases, mitigation measures that comply with historic preservation laws and regulations could be put in place to ensure that PFS would implement appropriate measures following identification and evaluation of significant cultural resources. Therefore, the Cooperating Federal Agencies propose that PFS be required to have a process to identify and evaluate any buried artifacts or cultural resources during construction (see Section 9.4.2).

4.7 Human Health Impacts

Except for transportation-related impacts, all human health impacts resulting from construction, operation and potential accidents at the proposed PFSF are discussed in this section. The human health impacts associated with the construction and operation of local transportation facilities in Skull Valley and the transportation of SNF are discussed in Section 5.7.

Section 4.7.1 presents the analysis of non-radiological impacts from construction and operation of the proposed PFSF. The analysis in Section 4.7.1 includes industrial morbidity and mortality from occupation-related activities and accidents. Section 4.7.2 presents the analysis of radiological impacts from the SNF stored at the facility, as well as potential radiological accidents and their consequences.

4.7.1 Non-Radiological Impacts at the Proposed Site (Site A)

During the construction and operation of the proposed PFSF, there are several non-radiological pollutants that may be of concern to worker and public health. The first group of pollutants of concern include the criteria pollutants and dust (both of which are addressed in Section 4.3). With adequate control measures, such as treating areas with water or chemical surfactants for dust suppression, etc., the impact on worker and public health would be expected to be small. There are no additional potential health impacts to the public from the proposed project, since members of the general public would not be allowed on the proposed PFSF site. Accordingly, no further analysis of these matters is necessary.

Potential health impacts to workers during construction of the proposed PFSF would be limited to the normal hazards associated with construction (i.e., no unusual situations would be anticipated that would make the proposed construction activities more hazardous than normal for a major industrial construction project). These normal hazards include fatal and nonfatal occupational injuries, which, for the construction industry, typically result from overexertion, falls, or being struck by equipment (NSC 2000). Because there are no unusual situations anticipated to make the construction-related activities at the proposed PFSF more hazardous than normal, there would be only small impacts to worker health and safety due to fatal and nonfatal occupational construction-related activities. The staff finds the non-radiological occupational health effects of the proposed action to be small. These are discussed below.

In order to estimate the number of potential fatal and nonfatal occupational injuries due to the initial construction, normal operations, and decommissioning of the proposed PFSF, data on fatal occupational injuries per 100,000 workers per year and data on nonfatal occupational injuries per 100 full-time workers per year were identified in the National Safety Council Injury Facts 2000 edition (NSC 2000). Data from both the Bureau of Labor Statistics (BLS) and the Occupational Safety and Health Administration (OSHA) are represented therein. The BLS and OSHA construction, trucking, and warehousing industry injury rates were used to estimate the potential fatal (using 1999 data) and nonfatal occupational (using 1998 data) injuries. Table 4.6 presents the expected number of potentially fatal and nonfatal occupational injuries during the construction and normal operations of the proposed PFSF.

Table 4.6. Estimated numbers of fatal and nonfatal occupational injuries for the construction and operation of the proposed PFSF

Activity	Duration of activity	Predicted number of fatal injuries	Predicted number of nonfatal Injuries[b]
Construction			
Phase 1	1.5 years	0.027	6.4
Phase 2	5 years	0.030	7.1
Phase 3	5 years	0.030	7.1
Operations	40 years[a]	0.184	6.5

[a]40 years includes 20 years of operations under the license and 20 years of operations under a renewed license, if any.

[b] Includes injuries and illnesses involving lost days of work.

Source: National Safety Council (2000). "Injury Facts" 2000 Edition, Itasca, IL.

There would be only small impacts to worker health and safety due to potentially fatal and nonfatal occupational injuries resulting from construction and normal operational activities. The estimated probabilities of injuries and fatalities would not require or warrant Federal, State, or community attention so as to require modification of construction-related or normal operational-related procedures.

4.7.1.1 Potential Worker Injuries During Construction

The proposed PFSF facility would be subject to OSHA's General Industry Standards (29 CFR Part 1910) and Construction Industry Standards (29 CFR Part 1926). Construction risks would be minimized by adherence to the procedures and policies established by OSHA.

These standards establish practices, procedures, exposure limits, and equipment specifications to preserve employee health and safety. In addition, OSHA inspections would also be employed in an effort to reduce the frequency of accidents and further ensure worker safety.

Potential fatalities. The construction of the proposed PFSF would occur in three phases. Phase 1 construction would require a peak work force of 130 workers and would be completed in about 1.5 years. Based on historical records of construction worker fatal occupational injuries, the estimated number of fatalities is 0.03; that is, much less than one, fatality would be expected to occur over the construction period. This estimate is conservative, because it assumes there would be a work force of 130 continually for the full 18-month construction period.

Phase 2 and 3 construction would require a work force of 43 workers (This number of workers is conservative because it includes workers that would also be present during the operational period for the proposed PFSF). Each phase would be completed in 5 years. It was estimated that less than 1 fatality would occur during each Phase (i.e., less than 1 fatality in Phase 2 and less than 1 fatality in Phase 3).

Potential nonfatal occupation injuries. Based on historical records of construction worker nonfatal occupational injuries that include lost workdays, the numbers of nonfatal injuries occurring during the 18-month Phase 1 construction is estimated to be about 6.4. Phase 2 and 3 construction would each last 5 years. For each phase of construction beyond Phase 1, the number of nonfatal injuries is estimated to be 7.1.

4.7.1.2 Potential Worker Injuries During Operations

Following Phase 1 construction of the proposed PFSF, the total number of employees needed to operate the facility would be approximately 43 workers. The overall design, layout, and operation of the proposed PFSF would minimize hazards to human health. Compliance with the Federal Occupational Safety and Health Standards, as well as safety standards specified by NRC, would help maintain the occupational safety record.

Potential fatalities. Operation of the proposed PFSF would involve receiving, transferring, storing, and shipping the SNF and would require a work force of about 43 people for up to 40 years (20 years under the initial license and 20 years under a renewed license, if any). Based on a statistical analysis of the trucking and warehousing industry, it was estimated that about 0.18 fatalities (i.e., less than one) would occur during a 40-year period of operations.

Potential nonfatal occupational injuries. A review of the trucking and warehousing industry records indicated that the expected number of nonfatal injuries accompanied by lost workdays at the proposed PFSF during normal operations over a 40-year period would be 65, or about 1.6 per year.

4.7.2 Radiological Impacts at the Proposed Site (Site A)

Construction and operation of the proposed PFSF would result in exposing PFSF workers and the general public to ionizing radiation. Phase 1 construction would be conducted without the presence of radioactive materials. As construction moves into Phases 2 and 3, there would be some storage casks present, and on-going construction activities would result in the installation of more storage casks. Thus, construction work leading to additional storage pads would be performed at the same time some pads are occupied with storage casks. Moreover, normal operations would bring workers into areas where they would receive radiation exposures. These would include the personnel that inspect and service the casks, the security personnel, and the machine operators who move casks to their storage locations. Radiological health impacts from the proposed action and alternatives are determined to be small, as explained below.

The proposed PFSF is an interim facility; thus, after a period of SNF receipt and storage, the SNF would be shipped to a permanent repository. During shipment to a permanent repository, the activities would be similar to those which occurred during the receipt of the SNF at the proposed PFSF, and the health impacts of both sets of activities would be similar. Therefore, no specific additional analyses have been performed for health impacts for this phase. For the purpose of analysis in this EIS, the radiological impact for removal of SNF is taken to be the same as the impact of receipt of SNF at the proposed PFSF, even though the dose for these casks would be lower than the dose when they arrived in Skull Valley due to radioactive decay over the storage period.

Radiation dose measures are discussed in the dialogue box presented in Section 3.7. The same measures are used in this section: radiation dose is given in terms of milliSiverts (millirem) and the consequential risk is given in terms of latent cancer fatality (LCF). The coefficients or factors used for health effects in this FEIS for the public and occupational radiation risk are 5×10^{-2} and 4×10^{-2} LCF/Sv (5×10^{-4} and 4×10^{-4} LCF/rem), respectively. These coefficients are based on data obtained at much higher doses and dose rates than those encountered by the general public or workers. A linear extrapolation from the lowest doses at which effects are observable down to the occupational range was used to generate these coefficients. The assumption of a linear extrapolation has considerable uncertainty, but is believed to present a conservative estimate of the risk. Table 3.18 in Section 3.7 provides the equivalent annual dose received by an average individual in the United States. Because of the sparse nature of on-site data, all comparisons below are made to the national average. The doses given below are presented in the form of incremental additions to existing background radiation doses. That is, in the discussion below, the estimated doses attributable to the PFSF are not added to background doses.

The methods used to estimate radiological impacts are as follows: PFS has provided dose estimates for the Holtec HI-STORM cask. An NRC staff analysis was made of PFS's approach. Results of dose estimates for key conditions demonstrated that PFS's approach provided results consistent with those of the staff; thus the analysis presented in this section is based on PFS's SAR.

4.7.2.1 Estimated Dose to the General Public

To assess the radiological impacts to the general public from routine operation of the proposed PFSF, analyses were performed that examine the potential dose to a hypothetical maximally exposed individual (MEI) located at the boundary of the proposed PFSF, as well as to individuals who may actually be present or reside nearby. In evaluating the potential radiation doses to members of the public, it is important to examine (1) the potential pathways of exposure and (2) the potential sources of radiation. Considering each of these two matters assures that all important issues are addressed.

The potential exposure pathways at the Skull Valley site include: (1) direct exposure to radiation (neutrons and gamma rays), including skyshine, that is emitted from the storage casks, (2) exposure to radioactive material through ingestion of contaminated water or food, including plants and animals in the vicinity of the site that may be used for subsistence, and (3) exposure to radioactive material through submersion or inhalation of airborne radionuclides. The evaluation of exposures from the first route requires consideration of the radiation source (i.e., the casks). Exposures from the second and third routes require that some radioactive material escape from the casks and the proposed PFSF. Given the PFS start clean/stay clean philosophy (i.e., PFS plans to reject and return canisters that have unacceptable external contamination), as well as the fact that no canisters would be opened at the proposed PFSF, and considering the engineered features of the canister/cask, there appears to be no viable mechanism by which significant radioactive materials would migrate off-site, or even away from the casks. Thus, while the latter two exposure routes are possible, radioactive material is unlikely to be available for ingestion or inhalation via those pathways during normal conditions, and hence, there is no opportunity for impacts from these pathways.

For this analysis, under normal conditions, the casks are assumed to maintain confinement of radioactive material under normal conditions. The lid of the dual purpose canister is double sealed, and consists of a closure lid to shell weld (lid-to-shell) and a closure ring to shell weld (ring-to-shell). In order for a leak to the environment to occur, both the primary and secondary welds must be leaking. Because the confinement boundary is welded and the temperature and pressure of the canister are within the design limits, no discernible leakage is credible (NRC/SER). In view of the above, direct radiation, including skyshine, from the casks would be the only source of radiation to members of the public as a result of normal operations. Accordingly, the balance of this discussion considers the doses attributable to the first pathway (i.e., direct radiation). The storage casks would emit direct radiation in the form of gamma rays and neutrons from the SNF sealed inside the canister. Radiation levels for the HI-STORM casks estimated by PFS are presented in Chapter 2, Table 2.6 for both surface contact and at a distance of 1 m (39 inches).

Doses at the nearest boundary. Dose rates for locations on the boundary of the OCA (see Figure 2.1) were presented by PFS for the HI-STORM cask design. The location that would result in the maximum exposure for a person at the boundary of the facility is to the north at a distance of 600 m (2,000 ft) from the boundary of the RA, which is 646 m (2,120 ft) from the storage pads. For the purposes of analysis, it was assumed that the PFSF consisted of an array of 4,000 HI-STORM storage casks each containing 40,000 MWD/MTU burnup and 10-year cooled PWR SNF. PFS has indicated that the average or typical SNF expected to be stored at PFSF would be PWR fuel having a 35,000 MWD/MTU burnup and 20 years cooling time. Such SNF would result in lower doses than the SNF assumed in this analysis. PWR fuel was assumed because PFS determined that the contact dose rates on top and at the duct openings of a HI-STORM storage cask containing PWR fuel are higher than those of HI-STORM casks containing BWR SNF (PFS/SAR 2001).

Assuming an individual works at the fence boundary at some time in the future, as much as 2,000 hours a year could be spent at this location. For an assumed annual 2,000 hours of exposure to a hypothetical individual at this location, the maximum annual dose to this individual would be 0.0585 mSv (5.85 mrem) (PFS/ER 2001). Doses to real individuals farther from the OCA, or who spend less than 2,000 hours at the boundary, would be smaller. The estimated 0.0585 mSv (5.85 mrem) dose is less than the 0.25 mSv (25 mrem) regulatory limit specified in 10 CFR 72.104 for the maximum permissible annual whole body dose to any real individual. The 0.0585 mSv/yr (5.85 mrem/yr) dose corresponds to slightly less than 2 percent of the natural background radiation dose in the United States of 3.0 mSv/yr (300 mrem/yr) (see Table 3.18). Using ICRP (1991) risk factors relating dose and LCF[1] risk for members of the public [i.e., 5×10^{-5} LCF/mSv (5×10^{-7} LCF/mrem)], the 0.0585 mSv/yr (5.85 mrem/yr) dose corresponds to an annual LCF risk of about 3×10^{-6} or about one chance in three million of developing a fatal cancer from one year of operations for an individual at the OCA boundary.

Dose to the nearest resident. The nearest resident is approximately 3.2 km (2 miles) east-southeast of the proposed PFSF site. At large distances, absorption and attenuation of radiation in the air becomes an important factor. Assuming a resident spent 8,760 hours (an entire year) at the location without shielding by the residence or other structures such as the flood protection berms, the computed annual dose would be 0.000356 mSv (0.0356 mrem) (PFS/ER 2001), which is smaller than the 0.25 mSv (25 mrem) regulatory limit specified in 10 CFR 72.104 for the maximum permissible annual whole body dose to any real individual. The 0.000356 mSv/yr (0.0356 mrem/yr) dose corresponds to about 0.01 percent of the natural background radiation dose in the United States. In addition, the 0.000356 mSv (0.0356 mrem) dose corresponds to an annual LCF risk of about 2×10^{-8} or two chances in 100 million of developing a fatal cancer from the maximum radiation exposure for an individual located at the nearest residence resulting from one year of operations.

[1]A latent cancer facility (LCF) is a measure of risk associated with exposure to ionizing radiation. For a detailed interpretation of numerical LCF values, the reader is referred to the discussion contained in the dialogue box in Section 3.7

4.7.2.2 Estimated Dose to Occupational Personnel

Workers at the PFSF would perform occupational tasks that can be grouped into four categories: (1) handling (i.e., receiving, transferring, and moving) of the SNF canisters and casks; (2) security, inspection, and maintenance activities; (3) administration and management; and (4) facility construction.

Category 1. PFS estimates that approximately 12 workers would be involved in Category 1 tasks: four for maintenance/operation activities, four for electrical activities, and four for radiation protection/health physics. Estimates of radiation dose to these workers have been made using time/motion studies. These studies are a part of PFS's ALARA (i.e., as low as reasonably achievable) dose reduction program. Occupational radiation exposures were estimated for the HI-STORM cask during the receipt of the shipping cask, transfer of the canister from the shipping cask to the storage cask (using a transfer cask), movement of the storage cask to the pad, and placement of the cask on the pad. The estimated dose rate values included both neutron and gamma contributions for fuel compositions considered to be representative of typical fuels. Details of the dose-task relationships can be found in Table 7.4-1 of PFS's SAR (PFS/SAR 2001).

Per individual canister, a collective dose of about 0.0025 person-Sv (0.25 person-rem) is estimated. The person-Sv (person-rem) is an expression of the collective dose equivalent exposure to a number of individuals doing different tasks. Based on the projected receipt of 200 casks annually, the total collective annual dose equivalent for Category 1 tasks is estimated to be approximately 0.49 person-Sv/yr (49 person-rem/yr). This yields an average of 0.0408 Sv/yr (4.08 rem/yr) for each of the 12 individuals. This dose is below the 0.05 Sv/yr (5 rem/yr) total effective dose regulatory limit specified in 10 CFR 20.1201(a) for occupational exposure. This dose equates to an LCF risk of 0.0016 per individual or about one chance in 600 of developing a fatal cancer from one year of operations. Because these exposures do not exceed NRC regulatory guidelines for workers, the staff finds the impacts to be small. In addition, the applicant's ALARA program would likely reduce the doses described above (see Section 4.7.4).

Category 2. The Category 2 tasks include inspection, maintenance, and security. PFS indicates that approximately 15 people would be involved in inspection and maintenance tasks. These tasks would take place inside the restricted-access area and would include cleaning of debris from inlet ducts, daily monitoring of temperatures of the casks, and quarterly inspections. These duties would be performed by the same 12 workers that perform Category 1 tasks, as well as 3 other persons. These inspection and maintenance tasks would result in a total collective dose equivalent of 0.037 person-Sv (3.7 person-rem) annually or approximately 0.0025 Sv/yr (0.25 rem/yr) for each of the 15 people. An annual dose of 0.0025 person-Sv (0.25 person-rem) equates to an LCF risk per individual, of 0.0001 or one chance in 10,000 of developing a fatal cancer from one year of operations.

Information in PFS's Environmental Report suggests that there would be some overlap of personnel between Category 1 tasks and Category 2 tasks. For the purpose of developing an upper bound dose estimate in this FEIS, the dose calculations in the remainder of this paragraph are based on the assumption that all 12 Category 2 workers performing inspection and maintenance tasks would receive the combined Category 1 and Category 2 doses as described in the preceding paragraphs. That is, the 12 workers that perform both the Category 1 and Category 2 inspection and maintenance tasks are assumed to each receive an average of 0.0433 Sv/yr [4.33 rem/yr (i.e., 4.08 + 0.25 rem/yr)]. This corresponds to an LCF of 0.0017 per individual (about one chance in 580). The summed doses are within NRC regulatory guidelines for occupational exposure; hence, the impacts are small.

The final Category 2 task involves security. Based on 4,000 storage casks, the radiation dose rate at the closest point outside of the restricted-access area (where security personnel will provide inspections) is in the range of 0.01 mSv/hr (1 mrem/hr). With multiple inspections each day, the security force is expected to accumulate approximately 0.006 person-Sv (0.6 person-rem) annually.

The total collective dose resulting from all Category 2 tasks (i.e, inspection, maintenance, and security) would be 0.043 person-Sv [4.3 person-rem (i.e., 3.7 + 0.6 person-rem)] annually (PFS/SAR 2001). Because these exposures do not exceed regulatory levels, the impacts are small. The 0.043 person-Sv (4.3 person-rem) dose corresponds to an annual LCF risk, as shared among all Category 2 workers, of about 0.0017 or about one chance in 580 of some Category 2 workers developing a fatal cancer from one year of PFSF operations.

Category 3. The next category involves tasks that are primarily associated with administrative functions. These workers would be located in buildings generally 600 m (2,000 ft) or more away from the restricted-access area and the buildings in which they work would provide shielding for them. Individual dose rates are anticipated to be below 0.25 mSv/yr (25 mrem/yr), not taking into account building shielding (PFS/SAR 2001). This upper limit dose to administrative personnel is about 8 percent of the natural background radiation dose in the United States (see Table 3.18) and would represent an annual LCF risk of about 1×10^{-5} or about one chance in 100,000 of developing a fatal cancer from one year of operations.

Category 4. During Phase 1 construction, the construction workers will have no exposure from storage casks because there will be none delivered until after Phase 1 is completed. However, during Phases 2 and 3 of construction, there will be storage casks on some of the pads while the construction workers prepare the additional storage pads. PFS estimates (PFS/ ER 2001) the dose to an individual worker during Phase 2 as 0.23 mSv/yr (23 mrem/yr), which corresponds to an LCF of 9.2×10^{-6} or about one chance in 109,000. For a work crew of 43 people, the collective dose would be about 0.01 person-Sv/yr (1.0 person-rem/yr). The exposure during Phase 2 construction is well within NRC dose limits and is small.

During the first half of Phase 3 construction, the estimated dose to an individual worker is 1.89 mSv/yr (189 mrem/yr), which corresponds to an LCF of 7.6×10^{-5} or about one chance in 13,000. For a work crew of 43 people, the collective dose would be about 0.081 person-Sv (8.1 person-rem). The exposure during the first half of Phase 3 construction is well within NRC dose limits and is small.

During the second half of Phase 3 construction, the workers would be relatively near stored casks. The estimated dose to an individual worker during the second half of Phase 3 is 0.00345 Sv/yr (0.345 rem/yr), which corresponds to an LCF of 0.00014 or about one chance in 7,200. For a work crew of 43 people, the collective dose would be about 0.148 person-Sv (14.8 person-rem). The exposure during the second half of Phase 3 construction is well within NRC dose limits and is small.

4.7.2.3 Estimated Doses from Off-Normal Operations and Accidents

Off-normal operations and accidents could potentially result in members of the general public being exposed to additional levels of radiation or radiological effluents, beyond those associated with routine operations. The potential radiological impacts of off-normal operations and accidents are presented and discussed in this section. As set forth below, radiological impacts from credible off-normal operations and accidents at the proposed PFSF are considered to be small.

The analyses presented in this FEIS are not intended to substitute for a detailed safety analysis or accident/risk assessment. A more detailed examination is included in the NRC staff's final SER, as updated. The NRC staff, as documented in the SER, evaluated the effects on the proposed PFSF of natural phenomena, including earthquakes, flooding, high winds, and tornados of the maximum severity expected at the proposed site during the lifetime of the facility. These events bound all of the natural phenomena expected to occur at the proposed PFSF. As set forth in the SER, for all such events, the proposed design for the PFSF provides reasonable assurance that radiation exposures would remain within NRC limits.

As is also described in the SER, the probability that natural phenomena would be more severe than those events evaluated is extremely low; such events at the proposed PFSF are not credible during the lifetime of the facility. Because these events are not credible, they are not considered in this FEIS. The information evaluated in this section is based on data provided by PFS. The analyses summarized in this FEIS are intended only to identify and bound the types of environmental impacts that could accompany off-normal operations or credible accidents.

Four categories of design events have been identified by PFS to aid in the examination of requirements for satisfying operational and safety criteria. The four categories are:

- Design Event I; an event associated with normal operations.
- Design Event II; an event associated with off-normal operations that can be expected to occur with moderate frequency, or on the order of once during a calendar year of operation of the proposed PFSF operations.
- Design Event III; an infrequent event that could be reasonably expected to occur over the lifetime of the proposed PFSF.
- Design Event IV; an event that is not reasonably expected to occur during the lifetime of the PFSF but is postulated to occur because it establishes a conservative design basis for systems, structures, and components important to safety.

Doses from the Design Event I scenarios are included for worker categories 1 through 4, above. Off-site doses to members of the general public would be lower than the doses to on-site workers. Hence, the analyses presented in this section focus on the last three design event categories because of the potential larger magnitude of the consequences of such events.

Design Event II. A Design Event II includes scenarios that result in a loss of external electrical power, off-normal ambient temperatures, partial blockage of storage cask air inlet ducts, operator error, and off-normal contamination release. Of these events, only partial blockage of the storage cask inlet ducts and a postulated release of removable surface contamination were found to result in an additional dose to either workers or the public. These two events are discussed below.

In the event of a partial blockage of the inlet ducts of a storage cask, facility personnel would be required to remove the debris or other foreign material blocking the duct(s). It is assumed that a single worker kneeling with hands on the inlet duct would require 30 minutes to clear the ducts. Assuming the highest dose rates associated with a storage cask containing SNF, a worker could accrue approximately 0.193 mSv (19.3 mrem) to the hands and forearms and 0.293 mSv (29.3 mrem) to the chest and body from the subject storage cask and the adjacent casks, in addition to doses the worker would receive during normal operations. These dose estimates remain below the annual regulatory limit of 5 rem for workers. No additional doses would result to members of the public from this event.

The other Design Event II involves the postulated release of removable surface contamination from the exterior of a fuel-containing canister into the environment. The analysis conservatively assumes that removable contamination at a level of 1×10^{-4} μCi/cm^2 covers the entire external surface of a canister and that the entire amount of removable external surface contamination is released to the atmosphere in the single Design Event II; however, this amount is significantly higher than is anticipated for canisters that would be received at the proposed PFSF. This is because only a small portion, if any, of the canister's exterior would have any removable contamination due to the preventive measures used during underwater loading at the originating nuclear power plant. In addition, the originating nuclear power plant would decontaminate the exterior of canisters to acceptable levels prior to shipment, and PFS would detect and return any canisters with unacceptable removable contamination levels upon receipt of the canisters at the PFSF (in a leak- tight HI-STAR shipping cask). PFS would also employ decontamination methods that would confine radioactive material as dry waste under a postulated off-normal condition. Therefore, the amount of removable contamination available for hypothetical release under off-normal conditions would be significantly less than the amount assumed by PFS.

For this event, PFS's ER examines a hypothetical individual located 500 m (1,640 ft) downwind from the release point. In addition, the most unfavorable meteorological conditions are assumed, and the dominant radioactive isotope released is assumed to be Cobalt-60 (Co-60). Co-60 is assumed because any contamination on the exterior surface of the canister is likely to come from the radioactive particulates suspended in the spent fuel pool water. At the time of loading, most of the particulates in the pool are the long half-life corrosion products from SNF surfaces that might dislodge during SNF movement. The most prominent particulates are Co-60, Co-58, Iron-55, Iron-59, Manganese-54, Chromium-51, and Zinc-65. Of these products Co-60 has the highest inhalation dose conversion factor and half life (5.27 years) (PFS/SAR 2001). For these conditions, the individual exposed at 500 m (1,640 ft) would receive a total effective dose equivalent of 0.000044 mSv (0.0044 mrem) and a committed dose equivalent to the lungs (the maximally exposed body organ) of 0.000255 mSv (0.0255 mrem). For on-site personnel, located 150 m from the release point, the total effective dose equivalent would be 0.0003 mSv (0.03 mrem), and the committed dose equivalent to the lungs would be 0.002 mSv (0.2 mrem). The staff considers these conservative dose estimates for this postulated off-normal condition to be insignificant because these dose levels are generally undetectable and well below regulatory dose limits in 10 CFR 72.104 (by approximately three to four orders of magnitude). Therefore, the staff finds the radiological impacts from these off-normal conditions to be small.

Design Events III and IV. For the purposes of analysis, no distinction is made between Design Events III and IV. Design Event III and IV include events such as earthquakes; tornadoes and missiles generated by natural phenomena; floods; fire (including wildfires; see Section 4.8.4) and explosions; storage cask drop or tip-over; loss of shielding; adiabatic heatup resulting from 100 percent blockage of air inlet ducts; and lightning. The NRC staff has concluded that two events (i.e., extreme winds and 100 percent air duct blockage) might create situations in which PFSF personnel could be exposed to higher levels of radiation than normal. No credible accident scenarios, however, would result in release of radiological material (including airborne radioactive materials). However, for the purposes of demonstrating compliance with 10 CFR 72.106(b), a hypothetical accident that results in an off-site release was analyzed. These events are discussed in the following paragraphs. A discussion of other accident events can be found in PFS's SAR.

Extreme winds in combination with debris (or missiles) from a design basis tornado [i.e., maximum wind speeds of 380 km/hr (240 mph); see PFS/SAR 2001] are not capable of overturning a storage cask or of damaging a canister within a storage cask, therefore, no radioactivity would be released. However, as concluded in the HI-STORM SAR (HOLTEC 2000), a design missile could cause a localized reduction in shielding resulting in increased dose rates on contact but would have a negligible effect on the dose at the OCA. PFS states that it would examine the HI-STORM storage cask to determine the extent of damage. If required, the canister would be transferred to another HI-STORM storage cask and the damaged cask repaired or permanently removed from service. Removal of the dual-purpose canister from the storage cask and placing it in a new cask would result in a dose of about 2.47 person-Sv (247 person-mrem).

On-site workers might also receive a dose during the removal of debris or other foreign material that created a 100 percent blockage of the inlet air ducts on a storage cask. A partial blockage was discussed above under Design Event II. The radiation dose to the worker who removes the 100 percent blockage is estimated to be double the dose estimated for the partial blockage case; hence, for the 100 percent blockage case, the dose to the worker would be 0.586 mSv (58.6 mrem) to the hands and forearms and 0.386 mSv (38.6 mrem) to the chest, which is below acceptable regulatory limits even when combined with normal worker doses.

Canister leakage under hypothetical accident conditions is not considered to be a credible event. Nevertheless, to demonstrate compliance with 10 CFR 72.106(b), a bounding calculation was performed. For this calculation, a leak rate of 1×10^{-4} cm^3/s is postulated and is assumed to remain undetected for 30 days, as well as 100 percent fuel rod failure. The leak rate assumed exceeds the vendor's calculated leak rate of 1.25×10^{-5} cm^3/s (at 843°K, 9.5 atm) for the HI-STORM storage cask. A suite of over 20 radionuclides is assumed to escape in the leak. The primary exposure mechanism would be inhalation of the leaking material. The resulting total effective dose equivalent (TEDE) to the exposed individual at the OCA boundary [approximately 500 m (1,640 ft) from the Canister Transfer Building] downwind from the leak for 30 days would be about 0.76 mSv (76 mrem). The maximum organ dose, 8.24 mSv (824 mrem), is the committed dose equivalent to the bone surface plus the dose for submersion in the plume. This dose is well below the regulatory dose limit for accidents in 10 CFR 72.106 [i.e., 50 mSv (5,000 mrem) for accidents]. Therefore, any individuals located at or beyond the nearest OCA boundary would not receive a dose that exceeds the regulatory limit.

For an evaluation of the potential doses from environmental pathways following deposition of material in the plume from the same hypothetical loss-of-confinement accident described in the preceding paragraph, the RESRAD computer code was used. The RESRAD analysis involves the hypothetical deposition of radionuclides from the atmospheric plume and the subsequent direct exposure to contaminated ground, inhalation of resuspended radioactive particles, ingestion of milk and beef following grazing in contaminated areas, and inadvertent ingestion of soil. The assumed exposure scenarios are considered to be conservative, given the current land use and conditions adjacent to the boundary of the proposed PFSF [i.e., at the 500 m (1,640 ft) downwind location]. The dominant exposure pathway was found to be contaminated land, with the radionuclide Co-60 being the largest contributor to dose. The resulting exposures from the assumed deposition of all radionuclides via all environmental pathways were total effective dose equivalents of 0.027 mSv/yr (2.7 mrem/yr) at 500 m (1,640 ft). This value is well below the dose limits established for accidents in 10 CFR 72.106; hence, the potential impacts would be small.

The NRC staff, has concluded that there are no credible mechanisms (either from off-normal operations or from hypothetical accidents) that would result in the release of radioactive SNF contents, including airborne radioactive material, into the environment. The only credible exposure scenarios are associated with worker exposures to direct radiation during cleaning of the storage cask vents or replacing a cask damaged by windborne debris. Such exposures would be small and would be administratively controlled to further reduce the exposure levels; hence, the potential impacts would be small.

Seismic Analysis. PFS provided an in-depth analysis in its license application that considered the ground faults in the vicinity of the site and other information relevant to seismic characteristics of the proposed facility design. PFS has requested an exemption from the NRC's seismic requirements specified in 10 CFR 72.102 that are based on deterministic methods. PFS requested, instead, to demonstrate that the proposed PFSF would be safe in a seismic event by using a probabilistic seismic hazard analysis (PSHA) to analyze potential seismic activity at the proposed PFSF. The NRC staff evaluated the exemption request and the supporting analysis and found that the applicant's method adequately considered the seismic factors at the proposed site and demonstrated that a seismic event would not pose an undue risk to public health and safety. The NRC staff also found that there is sufficient basis to grant the requested exemption if it issues a license for the proposed facility.

The NRC staff evaluation of the PFS seismic analysis is documented in Chapters 2 and 15 of the safety evaluation report, as updated. As discussed in Section 15.1.2.6 of the SER, the staff evaluated the PFS analysis of potential earthquake hazards (seismic events) at the PFS site and performed confirmatory analyses. It was determined, using a PSHA, that an earthquake event could result in a maximum ground acceleration of 0.711 g horizontally and 0.695 g vertically (1.0 g equals the acceleration from earth's gravity) within a given 2,000-year period at the site. PFS's accident analysis assuming this design basis earthquake and maximum ground acceleration was evaluated for the structures, systems, and components important to safety at the proposed PFSF (i.e., canister, concrete storage cask, transfer cask, lifting devices, canister transfer building, canister transfer overhead bridge crane, canister transfer semi-gantry crane, seismic struts, and cask storage pads) and considered both cask handling operations in the canister transfer building and storage operations on the pad. The analysis considered the stability of the cask storage pad, canister transfer building, and storage casks during the design basis earthquake. The analysis also assumed that the design basis earthquake could take place during any stage of facility operations such as canister or cask transfer activities.

PFS determined and the NRC staff confirmed from these analyses that the proposed PFSF and storage cask are adequately designed to withstand this maximum ground motion based on a 2,000-year return period. The storage canisters containing the SNF would remain intact during the design basis earthquake and therefore would not result in a release of radioactive material. Therefore, the staff concluded that there is no additional radiological impact from the proposed PFSF due to the occurrence of the design basis earthquake.

4.7.3 Impacts at the Alternative Site (Site B) in Skull Valley

The radiological impacts of constructing and operating the proposed PFSF at Site B would not be appreciably different than those described in Section 4.7.2 for Site A. While Site B is approximately 0.8 km (0.5 mile) closer to the nearest resident and would result in a slightly higher radiological dose to that resident, the difference is negligible.

4.7.4 Mitigation Measures

No additional mitigation measures would appreciably reduce the small radiological impact to the general public from routine operation of the proposed PFSF. Operations involving transfer of the canister and subsequent movement of the storage cask to its storage pad destination will require additional ALARA planning if PFS employs the small labor force suggested in its ER. The staff's assessment is that the upper bound dose estimate of 0.043 Sv/yr (4.3 rem/yr) for each of the 12 Category 2 workers (see Section 4.7.2.2) would require careful efforts to keep each worker's dose below the 0.05 Sv/yr (5 rem/yr) limit in 10 CFR 20.1201(a) for occupational exposure. In actual practice, individual doses to occupational personnel would be administratively controlled to ensure that they are maintained below the 0.05 Sv/yr (5 rem/yr) total effective dose equivalent occupational limit.

The occupational dose limit for workers of 5 rem/yr is based on consideration of the potential for delayed biological effects. The regulatory limit, together with application of the concept of keeping occupational doses ALARA, provides a level of risk of delayed effects considered acceptable by the NRC. Occupational doses to workers at the proposed PFSF could be maintained ALARA by means of active programs that involve administrative controls, engineering controls, measurements, and training. The PFSF Radiation Protection Manager would be responsible for administering the radiation protection program and for the radiation safety of the PFSF.

Finally, 10 CFR Part 20 requires that actual measurements of dose would be made as work is performed. Actual doses would be compared with estimated doses, as well as the dose limits in 10 CFR 20.1201(a), for both specific procedures and individuals, and administrative guidelines would be used to determine when corrective action should be taken to reduce doses for either specific individuals or for specific tasks. Radiation protection programs for the proposed PFSF are discussed in Section 7 of PFS's SAR (see PFS/SAR 2001). Radiation protection is evaluated in Chapter 11 of the NRC staff's SER, as updated.

4.8 Other Impacts

4.8.1 Noise

4.8.1.1 Noise During Construction

Noise impacts would result from construction equipment and earthwork activities, as well as from additional traffic associated with construction. Earthwork and excavation can generate noise levels up to 95 decibels (dB) in the A range of frequencies [dB(A)], which corresponds to the frequency range of human hearing. This noise level applies at a reference distance of 15 m (50 ft) from the source. Noise levels decrease by about 6 dB(A) for each doubling of distance from the source, although further reduction occurs when the sound energy has traveled far enough to have been appreciably reduced by absorption into the atmosphere. Absorption depends strongly on the frequency of the sound. Low frequencies often associated with construction equipment are typically absorbed at a rate of around 1 dB(A) per km (Campanella 1992).

Construction-related noise levels would be expected to be less than 48 dB(A) in the ambient air at the nearest residences. A noise level of 45 dB(A) has been identified by EPA (1974) as a guideline value for protection from indoor activity interference and annoyance in locations, such as schools, where quiet is a basis for use. That is also about the same as the outdoor background given for a "quiet suburban street" (EPA 1978). Therefore, noise from construction activity would not be expected to be annoying for residents located inside the nearest houses.

Increased traffic associated with construction activities could increase noise levels along Skull Valley Road by 5 dB(A), leading to noise levels as high as 69 dB(A) within 15 m (50 ft) of the road during peak traffic volume; at least two residences are included in this area (PFS/ER 2001). However, the area along Skull Valley Road is almost entirely undeveloped; therefore, community noise impacts in the area are expected to be small. The noise levels involved during peak traffic are in the range where noise can become highly annoying, and an increase of 5 dB(A) could be judged a moderate impact by some individuals. Probably of more importance would be the substantial increase in construction-related traffic throughout the day in this normally quiet area. Therefore, the temporary increase in noise associated with construction traffic would produce moderate impacts along the immediate vicinity of Skull Valley Road.

4.8.1.2 Noise During Operations

Noise resulting from operation of the proposed PFSF would be primarily from mobile sources associated with the delivery of casks. The loudest potential noise source would be a diesel switch engine operating on site. Momentary noise from routine operation could exceed 100 dB(A). Train whistles are often audible at distances greater than 1.6 km (1 mile); however, at greater distances the absorption of sound energy by the atmosphere is no longer negligible, and noise decreases by more than 6 dB(A) for each doubling of distance from the source, especially in the higher frequencies corresponding to a whistle (Campanella 1992). Nonetheless, a train whistle from an on-site switch engine would almost surely be audible at the nearest residence. Low-frequency noise from routine operation of a diesel locomotive is not likely to exceed the 45-dB level recommended by EPA for protection from activity interference or annoyance at indoor locations such as schools. However, outdoor sound levels would not be attenuated by structural features such as walls and windows. For brief periods of locomotive acceleration during movement of a cask, outdoor sound levels at distances of up to about 1.6 km (1 mile) from the source might occasionally exceed the 55-dB level recommended by EPA for protection from activity interference or annoyance at outdoor locations. However, it is not expected that the outdoor noise would be typically noticeable at the nearest residence. The exact noise level, and whether it would be noticeable would depend on several factors, including wind direction and background noise levels at the time. Because the locomotive would be expected to operate only a few hours per week, indoor and outdoor noise impacts are expected to be very small. Given the small magnitude of the noise impacts discussed above, no mitigation measures are warranted.

During construction, noise levels at the nearest residence would be only about 1 dB(A) louder if construction occurred at Site B instead of Site A; therefore, there are no distinguishable differences between the two sites in regard to construction noise impacts. Noise impacts resulting from normal operation of the proposed facility would be small at either Site A or Site B.

4.8.2 Scenic Qualities

Construction and operation of the proposed PFSF would change the scenic quality of Skull Valley by introducing an industrial presence into a largely undeveloped landscape. Facility construction would create the short-term visual impacts of additional dust from the operation of heavy equipment on-site and additional vehicle traffic on Skull Valley Road. Facility operation would create long-term visual impacts through the contrast of a large industrial facility with the surrounding landscape, the contrast of security lights with the surrounding darkness at night, and the generation of additional vehicle traffic as workers commute to and from the facility on Skull Valley Road.

The proposed action appears consistent with the BLM classification of the surrounding landscape. Nonetheless, changes in the scenic quality of the landscape would represent small to moderate impacts to recreational viewers, residents of Skull Valley, and motorists traveling Skull Valley Road. The following analysis explains the reasons for these conclusions.

4.8.2.1 BLM Perspective

The BLM administers 56 percent of the land within 8 km (5 miles) of the proposed PFSF site. The BLM evaluates the scenic quality of the land it administers through a “Visual Resource Inventory,” the objective of which is “to manage public lands in a manner which will protect the quality of the scenic (visual) values of these lands” (BLM 1984). Through such inventories, BLM classifies land into one of four categories depending on visual resource objectives (BLM 1986):

- Category I: Preserve the existing character of the landscape.
- Category II: Retain the existing character of the landscape.
- Category III: Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- Category IV: Provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt would be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Although the BLM does not administer the land on which the proposed PFSF would be located, most of the BLM lands in Skull Valley are classified as Category IV, the lowest category in terms of scenic values. Thus, from the BLM perspective, the proposed PFSF would be consistent with the Category IV classification, which allows for “high” levels of changes to the characteristic landscape.

4.8.2.2 Visual Analysis

To assess the visual impacts of the proposed PFSF, the most important visual resources in the project vicinity were evaluated. This was accomplished through a site visit and the use of photographs, maps, and the checklist included here as Figure 4.2. The important visual resources identified are primarily the undeveloped scenic qualities of the valley and the surrounding Stansbury and Cedar Mountains; these are discussed in Section 3.8.2.

Next, the groups of viewers who would be most affected by visual impacts based on their proximity and exposure to the proposed PFSF and their perceived sensitivity to changes in the surrounding landscape were identified (see Figure 4.2). The significance of potential visual impacts to the three primary groups identified–recreationists, local residents, and motorists on Skull Valley Road were then evaluated.

I. Description of Existing Visual Environment

1. Area surrounding project site can be identified by one or more of the following items:

	Within 1 mile	
Essentially undeveloped	Yes ☒	No ☐
Forested	Yes ☐	No ☒
Agricultural	Yes ☒	No ☐
Suburban residential	Yes ☐	No ☒
Industrial	Yes ☐	No ☒
Commercial	Yes ☐	No ☒
Urban	Yes ☐	No ☒
River, lake, pond	Yes ☐	No ☒
Cliffs, overlooks	Yes ☐	No ☒
Designated open space	Yes ☐	No ☒
Flat	Yes ☒	No ☐
Hilly	Yes ☐	No ☒
Mountains	Yes ☐	No ☒
Other: <u>Limited residential development related to Reservation and surrounding ranches</u>	Yes ☒	No ☐

2. Are there visually similar projects within:

One mile	Yes ☐	No ☒
Two miles	Yes ☐	No ☒
Three miles	Yes ☐	No ☒
Adjacent	Yes ☐	No ☒

II. Degree of Project Visibility

1. Will the project be visible from outside the limits of the project site?	Yes ☒	No ☐
2. The project may be visible from		
Site or structure on the National Register or State Register of Historic Places	Yes ☐	No ☒
Palisades	Yes ☐	No ☒
State or county park	Yes ☐	No ☒
Parkway	Yes ☐	No ☒
Interstate route	Yes ☐	No ☒
State highway	Yes ☒	No ☐
County road	Yes ☒	No ☐
Local road	Yes ☒	No ☐
Bridge	Yes ☐	No ☒
Railroad	Yes ☐	No ☒
Existing residences	Yes ☒	No ☐
Existing public facility	Yes ☒	No ☐
Adjacent property owner(s)	Yes ☒	No ☐
Other: <u>National Forest, designated Wilderness Area, designated Wilderness study area</u>	Yes ☒	No ☐

Figure 4.2. Visual impact identification worksheet.

3. Will the project eliminate, block, partially screen, or detract from views or vistas known to be important to the area? Yes Gx No G

4. Is the visibility of the project seasonal? For example, screened by summer foliage, etc. but visible fall/winter/spring? Yes G No Gx

5. How many linear feet of frontage along a public thoroughfare does the project occupy? 0 feet

6. Will project open new access to or create new scenic views or vistas? Yes G No Gx

7. Does proposed project or action plan to:
   a. maintain existing natural screening Yes Gx No G
   b. introduce new screening to minimize project visibility Yes G No Gx
   If yes, is screening: vegetative G structural G

III. Viewing Context

Viewers will likely be in which of the following situations when the project is visible to them?

	Frequency			
Activity	Daily	Weekly	Holidays, Weekends	Seasonally
Travel to and from work	Gx	G	G	G
Involved in recreational activities	G	G	Gx	Gx
Routine travel by residents	Gx	G	G	G
At a residence	Gx	G	G	G
At worksite	Gx	G	G	G
Other: ________________________	G	G	G	G

IV. Visual Compatibility

1. Are the visual characteristics of the project obviously different from those of the surrounding area? Yes Gx No G
   If yes, the visual difference is because of:
   Type of project Yes Gx No G
   Design style Yes Gx No G
   Size (including length, width, height, number of structures, etc.) Yes Gx No G
   Coloration Yes Gx No G
   Condition of surroundings Yes Gx No G
   Construction material Yes Gx No G
   Other: exterior lighting Yes Gx No G

Source: Adapted from Smardon, Palmer, and Felleman 1986 (as presented in Canter 1996).

Figure 4.2 (continued)

4.8.2.3 Recreational Viewers

As discussed in Sections 3.8.2 and 3.8.3, recreationists in Skull Valley and in areas adjacent to the valley would be able to view the proposed PFSF. Recreationists would access areas along the Stansbury Mountain ridge using the trail to Deseret Peak. The proposed PFSF could be visible from this area (see Figures 4.3 and 4.4). Additional recreationists on BLM lands would be able to view the proposed PFSF from the Cedar Mountains or from areas within Skull Valley. The facility would also be visible to bird watchers along Skull Valley Road (see Figure 4.5).

Recreationists in the Stansbury Mountains and along Skull Valley Road would be most affected by the visual intrusion of the proposed PFSF because it would be more visible from these areas than from the Cedar Mountains or from other areas within the valley. For many recreationists, particularly those seeking wilderness experiences, a large industrial facility in the midst of a scenic and nearly undeveloped landscape would represent a noticeable contrast and a moderate visual impact.

4.8.2.4 Local Residential Viewers

The facility would be the most noticeable manmade structure visible from the Goshute Village and other residences on the Reservation (see Figures 4.6 and 4.7). Residents of the Reservation (approximately 30 persons) would be the group with the most continuous view of the facility because of their proximity. The overall significance of visual impacts to local residents, including residents in Skull Valley outside the Reservation, would likely be moderate.

4.8.2.5 Motorists on Skull Valley Road

The facility would be highly visible to motorists on Skull Valley Road (see Figures 4.5 and 4.8), with most exposures being to daily commuters connecting to Interstate 80. From Skull Valley Road, the facility would be viewed against the distant background of the Cedar Mountains to the west. The facility would not affect the more scenic views of the Stansbury Mountains and Deseret Peak to the east. The facility would be the most noticeable manmade structure from Skull Valley Road, particularly at night because of the contrast between the security lighting and the surrounding darkness (see Figure 4.8). During the day, delays resulting from increased traffic associated with facility construction and operation could also influence aesthetic perceptions. Overall, it is likely that visual impacts to motorists on Skull Valley Road would be small to moderate because most exposures would be to regular commuters who are not likely to be as sensitive to the facility's appearance as are some recreationists and local residents.

4.8.2.6 The Alternative Site (Site B) in Skull Valley

The alternative site (Site B) is located about 800 m (2,600 ft) south of the proposed site and has very similar visual qualities. Site B would be approximately the same distance from the Goshute Village and Skull Valley Road as the proposed site. Therefore, the visual impacts of constructing and operating the facility at Site B would be similar to the impacts discussed above for the proposed site.

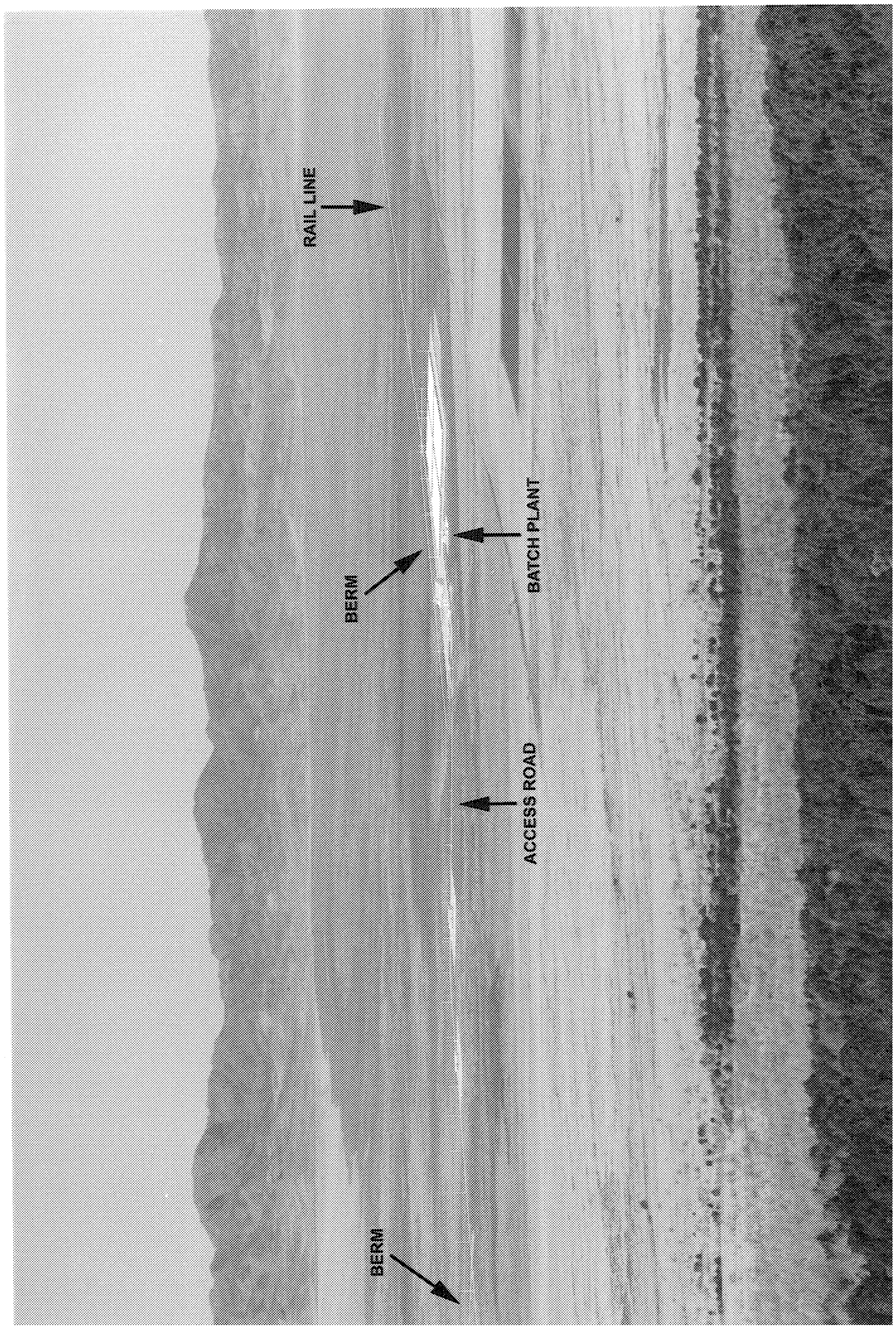


Figure 4.3. Artist's rendering of the daytime view of the proposed PFSF from Deseret Peak.

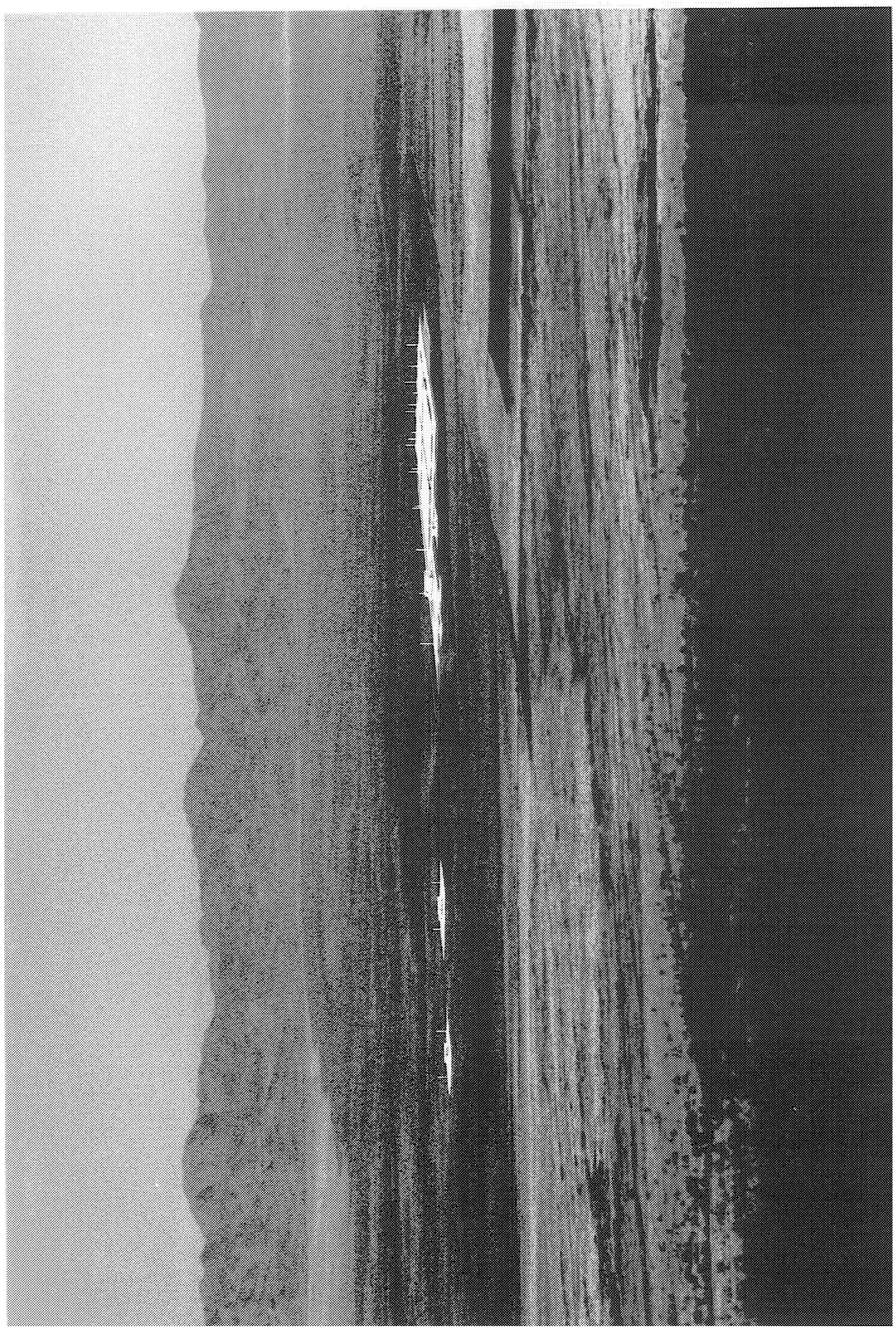


Figure 4.4. Artist's rendering of the nighttime view of the proposed PFSF from Deseret Peak.

Figure 4.5. Artist's rendering of the daytime view of the proposed PFSF from Skull Valley Road.

Figure 4.6. Artist's rendering of the daytime view of the proposed PFSF from the Goshute Tribal village.

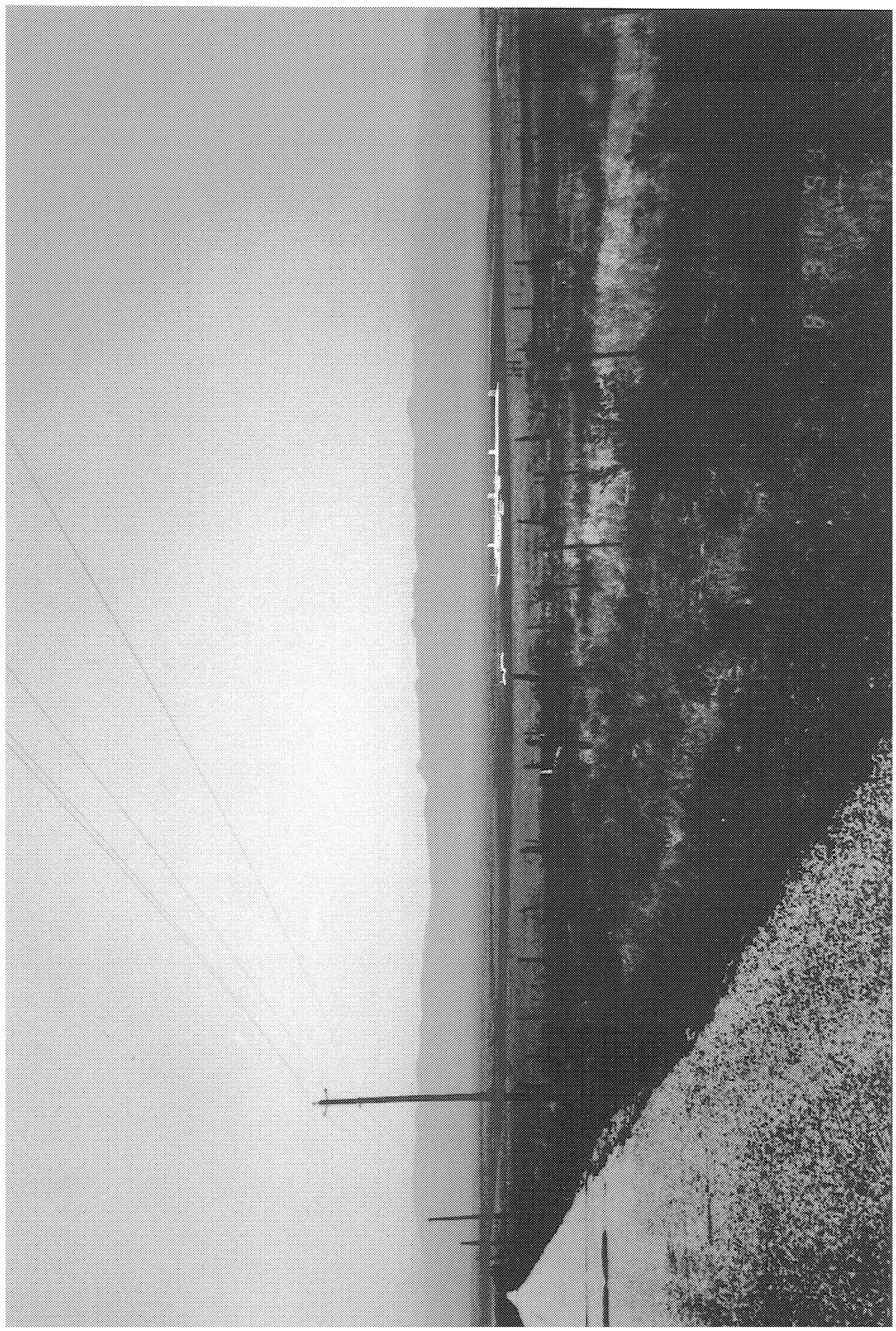


Figure 4.7. Artist's rendering of the nighttime view of the proposed PFSF from the Goshute Tribal village.

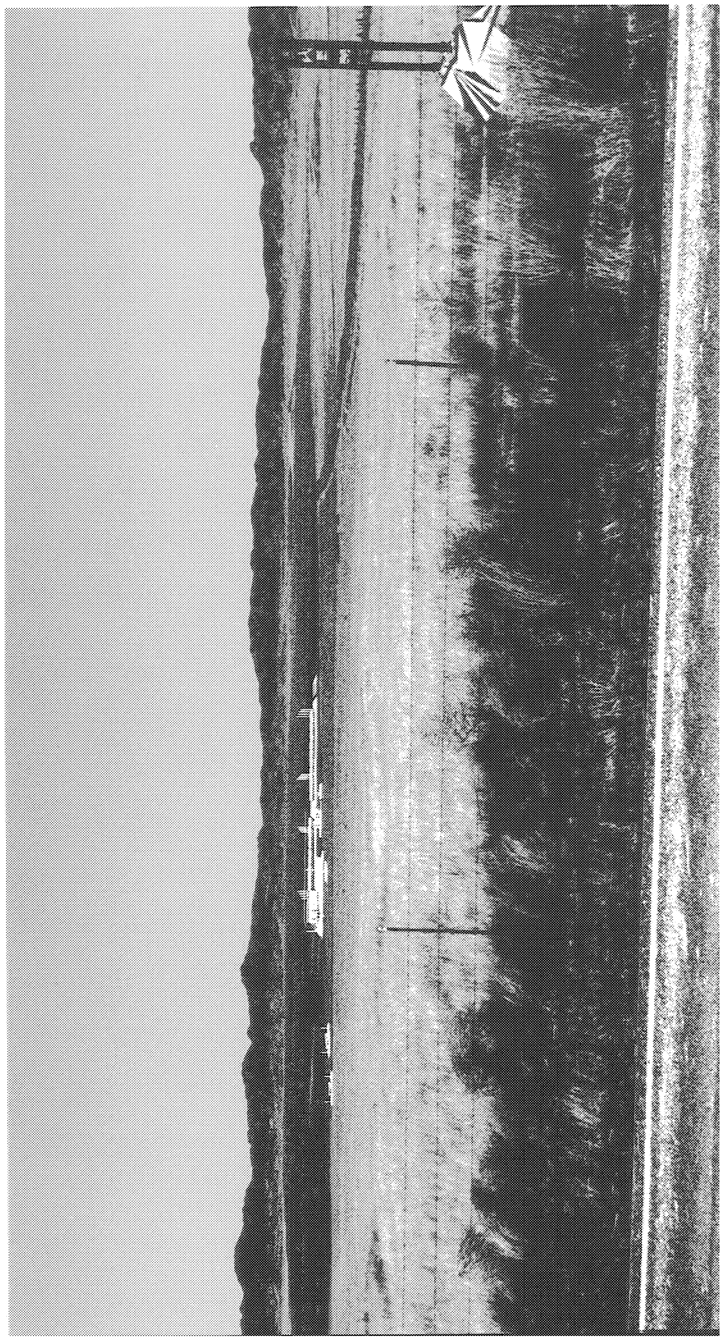


Figure 4.8. Artist's rendering of the nighttime view of the proposed PFSF from Skull Valley Road.

4.8.2.7 Conclusion Regarding Visual Qualities

Skull Valley and the mountain ranges that define the valley offer visual qualities that are very appealing to residents and visitors who appreciate undeveloped natural surroundings. While it is true that relatively few persons would view the proposed PFSF in this isolated location, some of the viewers may be sensitive to the facility's "industrial presence." Thus, because it would be a new industrial development in a nearly undeveloped setting, overall the facility would represent a small to moderate visual impact.

4.8.2.8 Mitigation Measures

PFS has identified certain measures it would utilize to make the facility less visible to potential viewers. For example, PFS would implement its proposal to use shielded lights to minimize light diffusion at night. PFS would consult with the BIA and BLM to determine whether planting native vegetation or constructing earthen berms would be useful in screening the facility. PFS would consult with the BIA and BLM to identify colors of paint that would blend facility structures with the surrounding landscape.

The Cooperating Agencies recommend that PFS use shielded lights to minimize light diffusion at night, and that PFS consult with BIA and BLM regarding the matters noted above.

4.8.3 Recreation

Direct impacts to recreational resources and opportunities are primarily associated with any physical changes to those resources and opportunities that would result from construction and associated activities. Indirect impacts are primarily associated with workers who might move into the area and place additional demands on existing resources and opportunities. As discussed in the following paragraphs, both direct and indirect recreational impacts are expected to be small.

Recreational uses of the land in Skull Valley include such activities as driving off-road vehicles, bird watching, and hiking. Because the site of the proposed PFSF is on tribal trust land, access restrictions for members of the general public already exist. There would be no additional impacts to recreational uses of this property by the general public beyond those that already exist.

Activities associated with construction of the proposed PFSF, including the movement of materials and workers to and from the Reservation, have the potential to affect recreational resources and opportunities. In particular, persons wishing to use Skull Valley Road to access recreational opportunities at Horseshoe Springs or the Deseret Peak Wilderness would occasionally encounter possible delays during the movement of materials and workers on Skull Valley Road (see Section 4.5). These impacts are expected to be greatest during the first part of the first phase of construction, when approximately 300 truck trips per day and 260 construction worker vehicle trips per day are expected. However, the Applicant's use of Skull Valley Road is expected to occur during the week and would not be expected to affect the use of Skull Valley Road by those who would generally recreate in the area on weekends. Impacts during operation of the proposed PFSF (i.e., over the twenty year license of the facility) would be expected to be even smaller, given the much smaller operating workforce associated with the operational period of the proposed PFSF (see Section 4.5).

Since demand on recreational resources varies directly with population, indirect impacts to recreational resources and opportunities are expected to be small because of the small numbers of in-moving workers expected during construction and operation of the proposed PFSF (see Section 4.5). As indicated in Section 4.5, the number of in-moving workers is sufficiently small, even when added to any accompanying family members (approximately 0.3 percent of the Tooele County total population in 1996), that any increased demand placed by those workers and family members on recreational resources and opportunities in Skull Valley or its surrounding areas (e.g., Mount Deseret, the Deseret Peak Wilderness, or the Wasatch-Cache National Forest) should not result in a noticeable effect on them. Accordingly, impacts to recreational resources are expected to be small.

Given the small magnitude of the impacts to recreational resources and opportunities expected to result from construction of the proposed PFSF, no mitigation measures are warranted.

4.8.4 Wildfires

As described in Section 3.4.1.1, wildfires have been a periodic problem in Skull Valley; however, the presence of the proposed facility would not be expected to increase the potential for fire in Skull Valley because of the actions to be taken by the applicant and based on the presence of an on-site firefighting capability described below.

The proposed SNF storage facility would be designed so that it would be appropriately protected from wildfires. A 90-m (300-ft) wide fire barrier would surround the 40-ha (99-acre) restricted area. As described in Section 4.4.1.1, this barrier would be planted with crested wheatgrass that would act as a fire retardant. In addition, the applicant will revegetate the rail route with native grasses which have a high fire tolerance. The area immediately around each of the storage pads would be covered with crushed gravel and would be kept clear of vegetation and other combustible materials. In addition, the PFSF has been designed to withstand the effects of fires on-site, as described in Sections 6 and 15 of the NRC staff's SER.

An on-site fire fighting capability would be provided by PFS personnel. A PFSF fire truck would be stationed at the site. A minimum of five staff personnel would be required to fully staff the PFSF fire brigade. Members of the PFSF fire brigade would be trained in the operation of the fire trucks and in advanced first aid. A second fire truck is presently located at the Goshute Village.

In the event of a fire at the proposed facility, personnel would be evacuated from the affected area and the fire brigade would be mobilized to mitigate the consequences of the fire. The Tooele County Fire Department would be called to assist in extinguishing fires beyond the capability of the fire brigade; however, the Tooele County dispatcher is located over 80 km (50 miles) by road from the proposed SNF storage facility in Skull Valley.

PFS has stated that it does not intend to use its proposed on-site fire fighting capability to assist with the fighting of wildfires not on the proposed PFSF site. The security personnel for the proposed facility would be equipped with appropriate emergency breathing apparatus such that the smoke from a nearby wildfire would not require them to evacuate the facility. Based on the above, the staff found no basis to conclude that the proposed PFSF would cause wildfires in the area.

4.9 Decommissioning and Closure

Decommissioning activities are generally described in Section 2.1.6; however, the actual actions taken to decommission the proposed PFSF at the expiration of its NRC license period cannot be predicted at this time. At least 12 months prior to the expiration of the NRC license for the proposed PFSF, a Final Decommissioning Plan must be prepared and submitted by PFS to the NRC. The requirements for the Final Decommissioning Plan are delineated in 10 CFR 72.54. This plan will be the subject of further NEPA review that would result in the NRC's preparing an environmental assessment or environmental impact statement, as appropriate, at the time the Final Decommissioning Plan is submitted to NRC. The discussion of potential impacts in this section is intended to capture the types of impacts that may occur during closure and decommissioning of the proposed PFSF.

The types of impacts that may occur during decommissioning would be similar to many of those that would accompany the initial construction of the facility, although some impacts, such as water usage and the number of truck trips, would be substantially lower. These construction impacts are discussed in Sections 4.1 through 4.8.

As discussed in Section 2.1.6, the fate of the buildings, structures, access roads, and other improvements for the proposed PFSF would be determined by consultation with the Skull Valley Band and BIA prior to termination of the lease for the proposed PFSF. If the Skull Valley Band and BIA elect to have the facility remain intact, then few environmental impacts would be associated with the closure and decommissioning of the facility. If the Skull Valley Band and BIA request the removal of any or all parts of the proposed PFSF, then the impacts similar to those described in the following paragraphs could occur.

4.9.1 Geology and Soils

The crushed gravel between the storage pads would represent an asset that could potentially be recovered and used to offset the loss of this resource that was incurred during the construction of the facility. It is unlikely that the casks, concrete pads, or foundations for the buildings could be recovered for reuse. If they are removed from the site, they are likely to become solid waste items that must be sent to an appropriate landfill for disposal. Any inaccessibility to mineral resources beneath the site would no longer exist after the proposed PFSF is decommissioned and removed.

Soil used in the construction of the flood protection berms could be used to cover the pads if they are left in place upon facility decommissioning and closure; however, it should be noted that the decommissioning action preferred by BIA would be to remove the storage pads. Assuming little to no elastic soil response to pad unloading, sufficient soil is available in the berms to cover the entire pad area to a depth of slightly over 15 cm (6 inches). However, this would likely not be sufficient for revegetating the area. If the overlay cannot be successfully revegetated, the soil placed over the pads is likely to erode. Therefore, a decision whether to cover the pads with soil should consider the potential for soil erosion. If revegetation is successful, soil removed from the berms and placed over the pads would create a gentle topographic rise over the area that is unlikely to result in an area of enhanced erosion or present an appearance significantly different from the topographic undulations of the valley that currently exist. (See the discussion of ecological resources and impacts below.)

4.9.2 Surface Water and Groundwater

The types of impacts to surface water and groundwater during the closure and decommissioning of the proposed PFSF would be similar to those that would accompany the construction of the proposed PFSF. It is anticipated that water would be required for dust suppression; however, the amounts of water anticipated to be needed during decommissioning activities would be smaller than that needed for construction of the facility, because construction of the facility would require water for concrete construction, and no concrete construction would be needed during decommissioning. Revegetation could also require PFS to water replanted areas. As described in Section 4.2 for construction of the facility, the impacts to surface water and groundwater during decommissioning would be small.

4.9.3 Air Quality

The types of impacts to air quality during the closure and decommissioning of the proposed PFSF would be similar to those that would accompany the construction of the facility, if the major structures are disassembled and removed from the site. As described in Section 4.3, these impacts would be small.

4.9.4 Ecological Resources

If the concrete storage pads were removed, the 40-ha (99-acre) restricted-access area would be recontoured and actively revegetated with native plant species. The flood protection berms would also be leveled, the storm water detention basin would be filled, and the 6 ha (14 acres) covered by those facilities would be recontoured and revegetated in a similar manner.

Any decommissioned and denuded areas (such as the areas covered by the flood protection berms) would be revegetated in conformance with then-current BIA standards. Careful consideration of the appropriate seed mixes and plants to use, soil conditions, and other measures including a thorough study of site-specific conditions (e.g., elevation, slope, aspect, soil chemistry) would aid in successful site restoration (see Section 4.4).

Removal of the concrete pads and other facilities followed by revegetation of the project area with native plant species would have a positive impact on areas where non-native, invasive plants such as cheatgrass now grow. This reclamation and revegetation would restore, and potentially improve, wildlife habitat, but might require active management for a period of years to ensure success.

If the storage pads are left in place, covered with topsoil, and revegetated with native plants, the success of revegetation would be dependent on placing a sufficient depth of soil on the pads and then selecting appropriate native species to plant. It is likely that 15 cm (6 inches) of soil would not sustain plant life in this part of Skull Valley. Plants from arid environments tend to have deeper roots than those growing in other ecosystems (Canadell et al. 1996). Big sagebrush, for example, growing in Utah has been reported to have roots that reach a maximum depth of 2.2 m (7 ft) (Richards and Caldwell 1987). Species which normally have roots that grow deeper than the depth of the soil placed on the pads would be less likely to survive. Breaking up the storage pads before placing soil on them might create large cracks through which roots could grow. It is BIA's position that 15 cm (6 in) of soil would not be sufficient to allow revegetation. Therefore, BIA proposes the removal of the pads. Use of BMPs as proposed by PFS in Section 2.1.4 and the additional BMPs listed in Section 9.4.2 during decommissioning of the proposed PFSF should keep the impacts on vegetation to a minimum. Revegetation of the proposed PFSF site would restore habitat for some wildlife in Skull Valley.

Based on the assessment of impacts to ecological resources during construction of the proposed PFSF (as discussed in Section 4.4), the impacts of decommissioning are expected to be small.

4.9.5 Socioeconomic and Community Resources

The types of impacts to socioeconomic and community resources during the closure and decommissioning of the proposed PFSF would be similar to those that would accompany the construction of the facility. As described in Section 4.1.5, these impacts would be small.

Perhaps the most potentially significant impact of the closure of the proposed PFSF would be the loss of revenue to the Skull Valley Band (from the lease payments) and to State and local governments (from tax or other payments). The Skull Valley Band and State and local governments would have sufficient notice of the date of the facility's closure to plan for this loss of revenue.

4.9.6 Cultural Resources

Because no further disturbance of land surface would accompany decommissioning activities, there would be no impacts to cultural resources.

4.9.7 Human Health

As discussed in Section 2.1.6, no radiological contamination of the facility, the storage casks, or storage pads is expected. In the event that residual contamination were discovered, it would be removed from the remainder of the uncontaminated items (as described in Section 2.1.4) and would be disposed as low-level waste in facilities properly licensed for that type of disposal.

Potential worker injuries during decommissioning. The proposed PFSF may be left in place for future Skull Valley Band use. However, should the Skull Valley Band decide the facility should be removed, it is assumed that the same amount of time and number of workers would be needed to complete the decommissioning activities as would be needed originally to construct the facility. Thus, the estimates of worker fatalities and injuries for Phase 1, 2, and 3 of construction are expected to be applicable to decommissioning. Consequently, 20.6 nonfatal occupational injuries with lost workdays are anticipated, and 0.09 (i.e., less than one) fatal injury is anticipated during decommissioning.

4.9.8 Noise

The noise that would accompany the dismantling and removal of any proposed PFSF buildings and structures would be similar to the noise generated by the initial construction of the facility. As discussed in Section 4.8, these impacts would be small.

4.9.9 Scenic Qualities

If the buildings and structures of the proposed PFSF are dismantled and removed from the site, then the scenic qualities of the area would be returned to the state they were in prior to the construction of the facility. This would constitute a favorable impact to the scenic qualities of Skull Valley.

4.9.10 Recreation

Because the site for the proposed PFSF is located on the Reservation, it is unlikely that any changes to recreational opportunities would accompany the closure and decommissioning of the facility. Impacts to recreational users of other areas would be similar to the impacts during initial construction. The impacts to recreation would therefore be small.

5. TRANSPORTATION IMPACTS OF THE PROPOSED ACTION

This chapter describes how the natural and human environment could be affected by the transportation of SNF to the proposed PFSF, and by construction, operation, and decommissioning of transportation facilities in Skull Valley that route or transfer SNF shipped from U.S. reactor sites to the proposed PFSF. In doing so, this chapter presents or references relevant data, describes the approach and methods used to predict future environmental effects, and presents an evaluation of the potential environmental impacts.

Each subsection describes, as appropriate, any potential impacts to specific categories of environmental resources. Each subsection also contains a concluding statement as to whether the potential impacts are judged to be small, moderate, or large. The standards used for these concluding statements are presented in the dialogue box on the following page. In addition to a discussion of the potential impacts, the possible mitigation measures that could be employed to eliminate or reduce the magnitude of any impacts are also presented and discussed within each subsection. Each subsection identifies certain of the possible mitigation measures that the Cooperating Agencies propose be required. See Section 9.4.2 for a complete list of the mitigation measures that the Cooperating Agencies recommend be required.

This chapter discusses the impacts of cross-country transportation of SNF (i.e., transporting SNF from U.S. reactor sites) to the proposed PFSF in Skull Valley. PFS member companies, and possibly nuclear power reactor companies that are not members, located throughout the United States could ship SNF to the proposed PFSF. This SNF would eventually be shipped to a permanent repository. Section 2.1.2.1 provides an overview of the transportation activities associated with the proposed action. Most U.S. nuclear power plants are located in the eastern part of the country, and SNF shipment from these reactors to the proposed PFSF would traverse a number of states. Therefore, the environmental impacts associated with cross-country transportation are considered in this FEIS. Because of the size and weight of the SNF shipping casks included in the PFS license application, shipment by rail is the only viable cross-country transportation option. Therefore, the focus of the cross-country transportation analysis in this chapter is on rail transportation.

In addition to cross-country transportation of SNF, this chapter also addresses the impacts of constructing and operating transportation facilities in Skull Valley. The proposed action would include the construction of a new rail siding at Skunk Ridge and a new rail line leading to the Reservation. An alternative method of local transportation is also addressed in this FEIS: the construction of an ITF near Timpie and the use of heavy-haul vehicles on Skull Valley Road from the ITF to the PFSF. Both the proposed action and the ITF alternative are addressed in this chapter. Decommissioning of the proposed transportation facilities, including rail line abandonment, is also discussed in this chapter. This discussion is based on currently available information. The NRC would not license the transportation facilities located away from the PFSF and does not require the decommissioning of those transportation facilities; those agencies responsible for transportation facility decommissioning will address that action with further NEPA documentation when those facilities are decommissioned.

Transportation of nuclear materials, including SNF is regulated by both the U.S. Department of Transportation (DOT) and the NRC. The safety of SNF shipments with respect to radiological impacts, especially in the event of a transportation accident, is ensured, in large measure, by the casks that contain the SNF. These casks must meet performance requirements specified in 10 CFR Part 71 and their design must be certified by the NRC.

Other elements of safety are provided for by the DOT's operating requirements for vehicles and drivers. These operating requirements are defined in various parts of 49 CFR.

The Surface Transportation Board (STB) thresholds for environmental analysis are contained in 49 CFR Part 1105. STB's environmental analysis of a proposed rail line covers two broad areas of impact: construction and operation. Construction-related impacts are evaluated for all new rail line constructions. Operation-related impacts are generally evaluated if the volume of traffic generated by the proposed construction exceeds STB's established thresholds.

STB's thresholds for analysis relate to both the number of trains per day and to gross ton-miles to be carried annually by the proposed rail line. Proposed rail line construction that would result in an increase of eight or more trains per day or at least a 100 percent increase in the gross ton-miles carried by the rail line would trigger the need for environmental analysis of operational impacts. Areas currently in non-attainment of Federal Air Quality Standards are subject to a stricter threshold: three trains per day, or a 50 percent increase in gross ton-miles carried.

The proposed PFS rail line would not exceed either of these STB thresholds. However, because of the hazardous nature of the cargo to be carried on the line, STB is considering potential environmental impacts along the proposed rail line and along railroad mainlines. This environmental review includes potential impacts from incident-free shipping, as well as from potential freight accidents and possible subsequent release of radioactive material.

DETERMINATION OF THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS

A standard of significance has been established by NRC (see NUREG-1437) for assessing environmental impacts. With the standards of the Council on Environmental Quality's regulations as a basis, each impact is to be assigned one of the following three significance levels:

- ***Small***. The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- ***Moderate***. The environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- ***Large***. The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

5.1 Geology, Minerals, and Soils

5.1.1 Construction Impacts

The environmental impacts to soils and geologic resources would include the loss of a portion of the soils resource, due to its physical alteration during construction, and access restrictions to economic geologic resources located beneath the proposed transportation facilities and their corridors. These alterations lead to a reduction in the soils' ability to support plant and animal life, and may possibly lead to changes in windborne erosion patterns, changes in surface water drainage and erosion patterns, and changes in infiltration characteristics. This FEIS describes the impacts to land use and the loss of vegetation and habitat in Sections 5.4 and 5.5, windborne erosion impacts in Section 5.3, surface water drainage and water erosion impacts in Section 5.2, and infiltration impacts in

Section 5.2. As discussed below, impacts to the loss of the soils resource and to economic geologic resources would be small.

The assessment for the loss of the soils resource compares the amount of soil to be lost in the construction of the proposed rail siding and the new 51-km (32-mile) rail line with the amount of similar soils resources available in Skull Valley. The assessment of impacts to economic geologic resources (e.g. aggregate) compares the estimated amount of materials required for construction with the availability of those resources in the area. It also considers the impacts to mineral resource exploitation in the immediate area of the proposed PFSF.

5.1.1.1 New Rail Line from Skunk Ridge

PFS has expressed confidence that the material generated in “cut” areas along the proposed rail line would be suitable for use in “fill” areas (PFS/ER 2001). The final design is expected to balance cut and fill areas. However, the existing soil profile would be altered during construction activities. PFS reports that approximately 95,600 m^3 (125,000 yd^3) of excess material would be generated from surface stripping operations in rail line construction, which would be used to stabilize side slopes (PFS/ER 2001). As discussed in Section 2.1.1.3, additional excess material [up to a total of 200,000 m^3 (261,000 yd^3), including the 95,600 m^3 (125,000 yd^3) from surface stripping operations] could also be generated. The estimated amount of spoil generated in rail construction is expected to be reduced during final design, but any excess material would be used as embankment dressing. Thus, there would be no impacts to any potential off-site fill areas or disposal sites. Soils used as slope and embankment dressing could be recoverable upon site decommissioning; thus, the soils resource would not be permanently lost. Impacts to the loss of the soils resource are therefore small.

Table 5.1 compares the amount of construction materials required in rail siding and rail line construction with the amount of material available in the area (see Section 3.1.4). The amount of sub-ballast required [172,000 m^3 (225,000 yd^3)] constitutes nearly 60 percent of the material available from the private sources identified by PFS [300,000 m^3 (393,000 yd^3)]. This would leave sufficient aggregate material available for other uses because five other locations on nearby BLM land exist where additional materials are available. A much smaller fraction (only 17 percent) of the ballast available from the private sources would be used for construction of the rail line. Thus, impacts to these economic geologic resources would be small. Mineral resources located beneath the rail siding and rail line would be unavailable for exploitation during construction. However, the impacts from this unavailability would be small due to the wide availability of similar minerals in the region.

5.1.1.2 New ITF Near Timpie

The existing soil profile at the location of the proposed ITF would be altered during construction activities. PFS reports that approximately 7,100 m^3 (9,300 yd^3) of excess soil (spoil) would be generated from stripping operations in ITF construction, which would be used as slope dressing (PFS/RAI2 1999). Soils used as slope dressing could be recoverable upon site decommissioning; thus, the soils resource would not be permanently lost. Impacts to the loss of the soils resource are therefore small.

Table 5.1. Comparison of transportation facility construction material requirements with quantities of materials commercially available in the vicinity of Skull Valley

Material type	Material required	Material available
Rail corridor from Skunk Ridge		
Sub-ballast	172,000 m^3 (225,000 yd^3)	300,000 m^3 (393,000 yd^3)
Ballast	73,000 m^3 (95,700 yd^3)	438,000 m^3 (572,000 yd^3)
Intermodal Transfer Facility		
Sand	880 m^3 (1,150 yd^3)	300,000 m^3 (393,000 yd^3)
Crushed rock	1,200 m^3 (1,600 yd^3)	465,000 m^3 (607,000 yd^3)
Access road base	500 m^3 (650 yd^3)	300,000 m^3 (393,000 yd^3)
Oval track base	2,300 m^3 (3,000 yd^3)	300,000 m^3 (393,000 yd^3)
Subballast	4,100 m^3 (5,400 yd^3)	300,000 m^3 (393,000 yd^3)
Ballast	3,300 m^3 (4,300 yd^3)	438,000 m^3 (572,000 yd^3)
Structural fill	2,000 m^3 (2,700 yd^3)	300,000 m^3 (393,000 yd^3)

Table 5.1 compares the amount of construction materials required for ITF construction with the amount of material available from the private sources identified by PFS. Less than 1.5 percent of the materials available from the private sources would be needed to build the ITF. Because most of this material could be recovered upon site decommissioning, impacts to these economic geologic resources would be small.

Mineral resources located beneath the ITF would be unavailable for exploitation during construction. However, the impacts from this unavailability would be small due to the wide availability of similar minerals in the region.

5.1.2 Impacts During Operations

5.1.2.1 New Rail Line from Skunk Ridge

Once the Skunk Ridge rail siding and rail line have been constructed, there would be no further impacts to soils or mineral resources during the operational phase of transporting SNF to the proposed PFSF. Extraction of subsurface mineral resources would not be permitted during operation; these resources, if any, would therefore be unavailable during the operational period. As explained above, the impacts from the unavailability of these resources would be small.

5.1.2.2 New ITF Near Timpie

Once the ITF has been constructed, there would be no further impacts to soils or mineral resources during the operational phase of transporting SNF to the proposed PFSF. Extraction of subsurface mineral resources would not be permitted during operation; these resources, if any, would therefore be unavailable during the operational period. As explained above, the impacts from the unavailability of these resources would be small.

5.1.3 Impacts at the Alternative Site B

5.1.3.1 New Rail Line from Skunk Ridge

As discussed in Section 5.1.1 above, impacts to the soils resource or to economic geologic resources would be small. The rail line to Site B would be approximately one mile longer than to Site A and would involve about 10 ha (24 acres) of additional land, thereby increasing the impact to soils resources. However, the impacts to the soils or economic geologic resources would not differ significantly from those for Site A.

5.1.3.2 New ITF Near Timpie

As described in Section 5.1.2, once the ITF has been constructed, there would be no further impacts to soils or mineral resources during the operational phase of transporting SNF to the proposed PFSF. This conclusion would apply to the proposed facility located at either Site A (i.e., the proposed site) or the alternative site (Site B).

5.1.4 Mitigation Measures

5.1.4.1 New Rail Line from Skunk Ridge

Soils (spoils) used during construction of the rail line from Skunk Ridge for slope dressing could be recoverable upon facility decommissioning and therefore are not lost. Economic geologic resources (e.g. aggregate) used in construction are similarly recoverable. Based on this assessment of the impacts to soils and economic geologic materials, no mitigation measures were identified that would appreciably reduce the effect to these resources.

5.1.4.2 New ITF Near Timpie

Similar to the new rail line, soils and aggregate materials are recoverable upon facility decommissioning, and no mitigation measures were identified that would appreciably reduce the effect to these resources.

5.2 Water Resources

Transportation facilities that may be constructed in association with the proposed PFSF include the 51-km (32-mile) long rail line along the western edge of Skull Valley and the ITF near Timpie. This section discusses hydrological impacts that could result from construction and operation of these two transportation options.

5.2.1 Construction Impacts

5.2.1.1 Surface Water

This section discusses impacts to the surface water system from transportation facility construction, including effects of channel modifications and impacts of flooding during construction.

New rail line from Skunk Ridge. As discussed below, small impacts related to surface water would occur from construction of the rail line from Skunk Ridge. The rail line would be constructed along a route near the base of the Cedar Mountains along the western edge of Skull Valley. The rail route would cross approximately 32 arroyos that would require the installation of 110 culverts (PFS/ER 2001). During construction, soils in and around the channel crossings would be disturbed temporarily and could lead to increased erosion and siltation in the vicinity of the construction site during periods of rainfall or snowmelt. Use of BMPs during construction, as planned by PFS, would control erosion and siltation during construction under normal weather conditions for the area. Potential impacts under flood conditions during construction are discussed in Section 5.2.1.2. BMPs for erosion control measures would mitigate the small impacts related to surface water along the rail line during construction. Pursuant to 40 CFR 122.26, PFS would be required to obtain a UPDES permit to protect surface waters from pollutants that could be conveyed in construction-related storm water runoff and would be required to prepare a Stormwater Pollution Prevention Plan because the construction of the rail line would disturb more than 0.4 ha (1 acre).

New ITF near Timpie. Impacts to the surface water system related to construction of the ITF would be small because the facility would have no interaction with the surface water system. The ITF would be located approximately 2.9 km (1.8 miles) west of Timpie in the area north of I-80 and south of the mainline railroad. The site occupies a small elevated area with no surface water drainage channels crossing the area. Construction activities would result in stock piles of disturbed soil that could lead to increased erosion, siltation, and sediment under normal weather conditions. Construction BMPs would be capable of controlling erosion and siltation of adjacent areas. Pursuant to 40 CFR 122.26, stormwater runoff from the proposed ITF construction site would be controlled under a general permit (i.e., UPDES) with the State of Utah. The UPDES permit is required because the construction of the ITF would disturb more than 0.4 ha (1 acre) (see Section 1.6.2.3).

Impacts to surface water quality. Impacts to surface water quality from construction of the transportation facilities would be small. Foreseeable effects on surface water quality during construction include (1) a spill of vehicular fuel into a surface water channel that contained flowing water, (2) the possible presence of motor oils and grease from construction equipment, and (3) a possible increase in sediment that could affect the quality of surface water runoff from the construction sites. The potential for a spill into a flowing surface water channel along the rail line is considered low because the flow channels involved along the rail line are dry arroyos for much of the year. The potential for surface channel contamination to occur at the ITF site is nearly nonexistent because no surface water flow channels cross the site. In any event, runoff from the rail line or ITF would be controlled under the UPDES permit.

5.2.1.2 Potential Impacts of Flooding

This section discusses impacts from flooding during construction, should such an event occur.

New rail line from Skunk Ridge. Impacts from flooding during construction of the rail line could be moderate, but the probability of such an occurrence is low. In the event that severe storms occurred during construction activity, there could be erosion of soil from the railroad embankment with consequent redeposition of soil in the downstream channels. Although PFS would use construction BMPs, a severe flood could overwhelm the capability of standard practices to control surface water flows in arroyos draining the Cedar Mountains. The severity of such an impact would vary with the storm intensity. Should severe flooding occur (i.e., storms associated with the 100-year flood event or greater), the eroded materials from the construction site would be commingled with natural sediment transported in the flood flows from areas adjacent to the rail line. The eroded material from the construction site would not cause a significant increase in impacts beyond those caused by natural sediment transport resulting from such an event.

New ITF near Timpie. The ITF would be on a slight topographical rise, approximately 2.9 km (1.8 miles) west of Timpie in the area north of Interstate 80 and south of the existing mainline railroad. The existing elevation of the ITF project area is from 1286.6 to 1288.1 m (4220 to 4225 ft). The ITF itself would be designed nearer the 1289 m (4225 ft) elevation. In 1986 the Great Salt Lake flooded to an historic elevation of 1284.1 m (4211.85 ft), which is well below the ITF area elevation. In addition, the Great Salt Lake Planning Project Draft Analysis of Proposed Management Alternatives, issued by the State of Utah Department of Natural Resources in January 1999, has designated the flood plain of the lake at 1284.15 m (4212 ft) for planning purposes and 1285.7 m (4217 ft) as the extent of the lake's floodplain (PFS/RAI2 1999e). Neither elevation is above the ITF design elevation. In the event that weather cycles similar those that occurred in the early to mid 1980s were to recur, and if the level of the Great Salt Lake were to rise, it would take several years to affect the ITF site. Between 1983 and 1986 the level of the Great Salt Lake rose about 3.7 m (12 ft). There would be ample time to remove any spent fuel in shipping casks from the ITP in the event that the level of Great Salt Lake approached flood levels during the lifetime of the facility.

Intense precipitation events could result in increased stormwater runoff at the ITF construction site. This could result in excessive waterborne erosion of spoil piles or piles of construction aggregate. Should severe flooding occur (i.e., storms associated with the 100-year flood event or greater), the eroded materials from the construction site would be commingled with natural sediment transported in the flood flows from areas adjacent to the ITF. The eroded material from the construction site would not cause a significant increase in impacts beyond those caused by natural sediment transport resulting from such an event. Otherwise, flood-related impacts during construction of the ITF would be small because the facility would be constructed in an area with little to no flooding. This stormwater would be controlled under a UPDES general permit with the state of Utah (see Section 1.6.2.3).

5.2.1.3 Water Use

This section discusses the water use and impacts related to construction of the transportation facilities.

New rail line from Skunk Ridge. Water use impacts related to construction of the rail line would be small. Construction of the rail line would require approximately 625 m^3/day (165,000 gal/day) of water during the 15-month construction period [totaling approximately 279,031 m^3 (74 million gallons)] for dust control and to provide water for soil compaction (PFS/ER 2001). This water would be acquired from an offsite source and trucked to the site. As discussed in Section 4.2, PFS has determined that at least one private source of water exists from which water of the required quantity and quality could be purchased to support project construction. Use of water from private supplies would not adversely affect water availability in the area. Water required for concrete culvert construction would be a small volume compared to the overall project water requirement (PFS/ER 2001). Bottled drinking water from offsite sources would be provided for construction workers. Drinking water for personnel during operations would be provided from the PFSF.

Additional quantities of water would be required for the planned revegetation of disturbed areas along the rail corridor and would be acquired from private off-site sources. The volume of water needed is dependent upon the method used to revegetate the area. The water requirements will be determined during the development of a final revegetation plan. Therefore, no estimate is available at this time as to how much water would be needed for this purpose. The criteria that would need to be implemented to ensure successful revegetation are described in Section 4.4.5.

New ITF near Timpie. Impacts related to water use from construction of the ITF would be small. Water required for dust control during construction of the ITF is estimated by PFS to be approximately 71 m^3/day (18,800 gallons/day) during the construction period and the water would be acquired from offsite sources and trucked to the site. The construction period for the ITF would be approximately 1 year, and the maximum water volume that would be used during this period, based on the available information, would be about 25,300 m^3 (6.9 million gallons). As discussed in Section 4.2, PFS has determined that at least one private source of water exists from which water of the required quantity and quality could be purchased to support project construction. Use of water from private supplies would not adversely affect water availability in the area. Concrete for the gantry crane foundation would be mixed at the batch plant at the proposed PFSF site and water required for this concrete [about 9 m^3/day (2,400 gal/day)] for a short period of time would be obtained at the proposed PFSF site. This small amount of water would not adversely affect groundwater usage.

5.2.1.4 Groundwater

Impacts that could occur to groundwater are expected to be small as a result of construction of the transportation facilities. Groundwater could be affected by stormwater runoff from the site during construction; however, the proposed construction activities would not increase the quantities of runoff. The presence of motor oils and greases from construction equipment, as well as increased sediment, could affect the quality of the runoff, but because small quantities of runoff would be involved, the overall impacts to groundwater quality would be small.

The only foreseeable event that could impact groundwater quality during construction of the rail line would be a large accidental spillage of vehicular fuel used by construction equipment for which no mitigative cleanup actions were taken. Although a detailed groundwater investigation has not been performed at the proposed ITF site, the expected depth to groundwater beneath the site after construction would be approximately 7 m (21 ft). It can thus be assumed that an uncontained spill of fuel or other liquid contaminant source at the site could reach the groundwater table at the ITF site. Groundwater quality at the ITF site has not been determined; however, it is likely saline because of the proximity to the Great Salt Lake. Should a spill occur without mitigation resulting in contamination of groundwater at the ITF there could be adverse effects to aquatic/wetland habitats downgradient toward Great Salt Lake. The Cooperating Agencies propose to require that PFS prepare a Best Management Practice Plan to address the impacts from spills for the transportation facilities, including the ITF.

5.2.2 Impacts During Operations

5.2.2.1 Surface Water

This section discusses impacts related to surface water from operation of the transportation facilities including impacts that would be expected under normal climatic conditions and impacts related to flooding.

New rail line from Skunk Ridge. Under normal weather conditions, the impacts related to the surface water hydrological system from operation of the rail line would be small. Small local changes in the flow channels would have occurred as a result of construction of the rail corridor and its associated culverts. These culverts would be sized and aligned so as to minimize the significance of any changes to the natural drainage channels. During operation of the rail line, these culverts would intermittently carry water from rainfall and snowmelt. Under normal weather conditions in the area, some sediment accumulation upstream of the culverts could occur after stormflow events, altering channel morphology. Downstream scour can be minimized through use of rip-rap at sites where rapid flow velocities would occur at culvert outlets. An applicant may develop design packages that include criteria that specify flow velocity thresholds requiring rip-rap to be placed at culvert outlets. Under normal conditions, these features would prevent erosion downstream of the culverts. PFS has designed culverts along the corridor to carry the precipitation from a 100 year flood event (Donnell 1999).

New ITF near Timpie. Under normal weather conditions, the impacts related to operation of the ITF would be small because all activities would occur inside a building and there would be no interaction with surface water. During operation of the ITF, stormwater runoff from the site would be controlled. Because of the types of impervious surfaces (i.e., buildings, asphalt, concrete) at the proposed ITF, runoff quantities would be expected to increase at the site but not to a significant extent. Also, the presence of motor oils and grease from vehicles could result in a degraded quality of this runoff as compared to what exists at the site now. These impacts, however, are expected to be small considering the small quantity of oil and grease expected to be present and the small amount of runoff that would be involved.

Impacts to surface water quality. Surface water quality impacts related to operation of the transportation facilities would be small. No permanent surface water bodies exist near the transportation facilities and therefore, under normal weather conditions, there would be no impacts to perennial surface water features. Seasonal surface water flows would occur along the rail line and an accidental spill of locomotive fuel near one of the channel crossings could occur but would be an unlikely event. Should such a spill occur during a season when surface water was present in channels along the rail route, emergency response could intercept and clean up the spill, contaminated surface water, and contaminated soils to mitigate the incident.

5.2.2.2 Potential Impacts of Flooding

This section describes the impacts to the hydrologic water system related to the transportation facilities that could result from flooding during operations.

New rail line from Skunk Ridge. Impacts that could occur to the surface water system along the rail line in the event of major flooding would be small. The presence of the rail line is not expected to increase flooding downstream but may slightly reduce peak flows downstream during high flows because of temporary pooling of water upstream of culvert inlets. PFS's design for culverts at arroyos along the rail line would accommodate flows up to and including those expected in a 100-year flood without overtopping the embankment. The design incorporates rip-rap to prevent or minimize erosion and scour below culvert outfalls under high flow conditions.

Flows in excess of the 100-year flood could result in overtopping of the railroad embankment at one or more locations. Such an event would possibly erode a portion of the embankment and could contribute to downstream siltation. Such a severe flood could also be accompanied by mudflows or debris flows from the upper arroyos in the Cedar Mountains. Mudflows or debris flows would likely plug the culverts and would accumulate in the area upstream from the railroad embankment. Large flows could cover the railroad and block rail access to the PFSF site until their removal. This event is considered to have a low impact, because it would be a natural event and would not be triggered by the presence of the rail line. If such an event occurred, there would be abundant natural damage in the area and the incremental contribution from material eroded from the railroad embankment would be minor in comparison to the naturally derived flood debris.

Similarly, culvert blockage could result from windblown debris (such as tumbleweed); however, if PFS conducts appropriate maintenance of the culverts along the rail line this impact could be minimized. If such maintenance included periodic inspection and clearing of any obstructions within the culverts, these culverts would function as designed and stream flow alternation would be minimized.

New ITF near Timpie. The recent high water level for the Great Salt Lake was approximately 1284 m (4211.15 ft) in 1986. Planning documents issued by the State of Utah Department of Natural Resources in January 1999 designate the floodplain elevation of the Lake as 1284 m (4212 ft) for planning purposes and 1285.7 m (4217 ft) as the extent of the Lake's historic floodplain (in about 1670 to 1700 A.D.). The ITF would be constructed at an elevation of 1288.1 m (4225 ft)—well above the designated floodplain of the Great Salt Lake. Therefore, flooding is not expected at the ITF site during operations.

5.2.2.3 Water Use

Water use impacts during operation of the transportation facilities would be small. Water use during operation of the rail line would be limited to drinking water for personnel. Bottled water from the proposed PFSF would be provided to the workers. The incremental consumption of water by rail crew members would not have an adverse impact on water availability.

During operation of the ITF, water would be used for drinking and restroom facilities. Water needed during operation of the ITF would be obtained from a local commercial water supplier. Considering the small number of workers (approximately 9–11 people), acquisition of water from a commercial source would not have an adverse impact on water availability.

5.2.2.4 Groundwater

Any impacts to groundwater that would occur during operation of either the rail line or the ITF would be small because no groundwater is proposed for use. Accidental spillage of fuel could contaminate soil at some location along the rail corridor. However, this is unlikely because refueling activities would be limited to the rail siding. PFS's Best Management Practices Plan could prescribe methods for properly responding to fuel leaks or spills to prevent any impact to groundwater from such an event. To ensure that construction and operational activities will not lead to contamination of groundwater, the Cooperating Agencies propose that PFS be required to implement a BMP including a spill response procedure, and be required to be responsible for clean up of spills or accidents at the rail siding and along the rail line in conformance with applicable standards (see Section 9.4.2).

During operation of the ITF there is little potential for such fuel spills to impact groundwater quality because the primary activity would be the transfer of SNF casks from railcars to heavy-haul vehicles. The nature of the proposed ITF activities is not likely to cause accidental spills. Nevertheless, to minimize the potential for adverse impacts to groundwater from construction and operational activities, the Cooperating Agencies propose that PFS be required to implement a BMP including a spill response procedure, and be required to be responsible for clean up of spills or accidents at the ITF, should that option be chosen, in conformance with applicable standards.

5.2.3 Impacts at the Alternative Site (Site B)

Construction and operation of either the rail line or ITF with the proposed PFSF at Site B would produce impacts to surface water and groundwater that would be similar to those of a facility located at Site A. These impacts are described above.

5.2.4 Mitigation Measures

Impacts to water quality could occur if a significant accidental vehicular fuel spill occurred during the wet season or if spills occurred but were not cleaned up. A Best Management Practices Plan for the rail line (or ITF, should that option be chosen) could prescribe methods for minimizing or eliminating adverse impacts on groundwater from spills. Accordingly, the Cooperating Agencies propose that PFS be required to develop a Best Management Practices Plan, including a spill response procedure, for the proposed rail line or ITF, and be required to be responsible for clean up of spills or accidents at the rail siding, along the right-of-way for the rail line, and at the ITF (see Section 9.4.2).

To minimize the significance of any changes to the natural drainage channels, the Cooperating Agencies propose that PFS design culverts along the corridor to carry the precipitation from a 100-year flood event. A maintenance plan to periodically check the rail line culverts for windblown debris and to clean them as necessary would keep them free of such material, and would ensure the rail line culverts would function as designed, thus minimizing stream flow alterations. Accordingly, the Cooperating Agencies propose that PFS be required to develop a maintenance plan to check the rail line culverts for debris and clean them as necessary (see Section 9.4.2).

5.3 Air Quality

5.3.1 Construction Impacts

As discussed below, 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 operations would be small.

During construction of either the proposed Skunk Ridge rail corridor or the ITF near Timpie, temporary and localized increases in atmospheric concentrations of nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), volatile organic compounds (VOCs), and particulate matter would result from exhaust emissions of workers' vehicles, heavy construction vehicles, diesel generators, and other machinery and tools. Particulate matter in the form of fugitive dust emitted from excavation and earthwork would lead to local increases in atmospheric concentrations of PM-10 where construction occurs near Interstate 80. As would be the case for construction of the proposed PFSF (see Section 4.3.1), fugitive dust would be the primary source of impact to air quality during construction of either the proposed Skunk Ridge rail corridor or the ITF near Timpie.

As discussed below, construction of new rail sidings at either Skunk Ridge or Timpie could produce temporary airborne concentrations that exceed the 24-hour PM-10 standard along segments of

Interstate 80 that pass near the construction area(s). Such airborne concentrations often occur near road construction areas that involve appreciable excavation/earthwork. Airborne dust in road construction areas can sometimes affect visibility. While such dust is usually not sufficient to create a safety hazard, it can cause annoyance and inconvenience. These types of impacts are discussed below, along with their applicable mitigation measures.

5.3.1.1 New Rail Line from Skunk Ridge

A new rail siding (see Figure 2.4) would be constructed near Skunk Ridge to connect a proposed new rail line with the existing Union Pacific main line. The preferred route for the new rail line would begin near Skunk Ridge and proceed eastward, roughly paralleling Interstate 80, for about 5 km (3 miles) before proceeding southward to a location due west of the proposed PFSF site (see Figure 1.2). From there it would proceed eastward to an area just south of the proposed storage pads (see Figure 2.2). The area of greatest potential PM-10 impact is considered to be along the northern end of the proposed rail line where it would run parallel to Interstate 80. Impacts at that location would be analogous to those from typical construction of a highway interchange, where members of the general public could be exposed to high PM-10 concentrations for brief periods as their vehicles pass through the construction area.

To obtain an upper bound estimate of PM-10 impact from construction of the new rail line, a total area of 5 ha (12.4 acres), 1 km (0.6 miles) long and 50 m (164 ft) wide, was assumed to be simultaneously undergoing heavy construction. This construction area was assumed to run west-east (approximately parallel to the highway), with its nearest boundary 50 m (164 ft) south of the highway. Assumptions regarding emissions per unit area and work schedule were the same as those for the analysis of the proposed PFSF construction discussed in Section 4.3.1, and the same 8 years of meteorological data from SLCIA were used. The same model used for modeling effects of site construction [i.e., ISCST (EPA 1995)] was applied to obtain the air-quality impacts.

To avoid exceeding the NAAQS for PM-10, 24-hour average concentrations could not exceed 150 µg/m^3 and annual average concentrations could not exceed 50 µg/m^3. The existing background values for 24-hour and annual average PM-10 concentration (from Table 3.3) are 87 µg/m^3 and 22 µg/m^3, respectively. Therefore, to avoid an exceedance of the NAAQS, the maximum construction-related PM-10 concentrations would be 63 µg/m^3 for a 24-hour average and 28 µg/m^3 for an annual average.

The maximum modeled 24-hour average construction-related PM-10 concentration along Interstate 80 was 290 µg/m^3; mitigation would have to reduce fugitive dust to about 20 percent of its uncontrolled value (i.e., 20 percent of 289, or 58 µg/m^3) to avoid an exceedance of the NAAQS. Modeled construction-related fugitive dust exceeded 200 µg/m^3 on only 6 days during the 8-year modeling period; therefore, in the vast majority of cases, mitigating fugitive dust to about 30 percent of its uncontrolled value (i.e., 30 percent of 200, or 60 µg/m^3) would be sufficient to avoid an exceedance of the 24-hour NAAQS for PM-10. The maximum annual average concentration expected from construction 5 days per week was less than 32 µg/m^3. A reduction of only about 12 percent would keep construction-related PM-10 concentrations at levels at or below 28 µg/m^3 and cumulative concentrations below the NAAQS. This level of reduction is expected to occur as a result of mitigating fugitive dust emissions to the level required to avoid exceeding the 24-hour NAAQS.

If normal dust suppression measures are implemented, impacts of constructing a rail line and siding south of Interstate 80 are expected to be equal to or less than effects of typical road construction in the area. Temporary and localized moderate impacts would be expected in the immediate vicinity of the construction area, and small impacts would be expected elsewhere. These effects can be mitigated to acceptable levels by dust control measures, such as surface wetting, and by restricting the area under construction at any one time to less than 5 ha (12.5 acres).

5.3.1.2 New ITF Near Timpie

For the proposed ITF (see Figure 2.14), the largest area that would be under construction at any one time is projected to be about 4.5 ha (11 acres). The ISCST air dispersion model (EPA 1995) and assumptions similar to those used in the analysis of construction of the proposed PFSF and the proposed rail line were applied to the analysis of air quality impacts from this construction. As in those analyses, construction impacts and effects of local sources were added to background values of PM-10 concentrations to obtain cumulative impacts. On some days during construction, particulate concentration could exceed the 24-hour PM-10 standard along as much as 650 m (about 0.4 mile) of Interstate 80 if no dust suppression measures were used. If the 24-hour PM-10 standard were briefly exceeded, the location of the stretch of highway affected would depend on wind direction. Watering to reduce fugitive dust by 50 percent would be expected to prevent exceedances of the 24-hour NAAQS for PM-10 along Interstate 80. No airborne concentrations exceeding the annual NAAQS would be expected along Interstate 80, even if no mitigation (e.g., sprinkling with water) were applied. These temporary and localized effects of construction are expected to produce occasional and localized moderate impacts on air quality in the immediate vicinity of the construction activity, and small impacts elsewhere. These effects would be mitigated by dust control measures, such as surface wetting.

5.3.2 Impacts During Operations

5.3.2.1 New Rail Line from Skunk Ridge

As discussed in Section 4.3, the air quality impacts expected from operation of a rail line and a switchyard locomotive at the storage site are expected to be small. Locomotives using the rail line would emit pollutants in only one area for a very short period before moving on. Operation of a switchyard locomotive would be sporadic, occurring for an hour or two on any particular day, and pollutant emissions would be dispersed over the area traversed by the locomotive.

5.3.2.2 New ITF Near Timpie

Air quality impacts expected from operation of transport vehicles are typical of those from combustion engines used to power locomotives and construction equipment, diesel generators, etc. Some emissions of NO_2, SO_2, PM-10, and CO would occur; however, their effects on long-term air quality would be small because of the infrequent occurrence of cask transfer from railcars to heavy haul trucks. Short-term effects would involve emissions that would not add appreciably to those from vehicles routinely using Interstate-80. Impacts from the operation of the ITF near Timpie are, therefore, expected to be small.

5.3.3 Impacts at the Alternative Site B

5.3.3.1 Construction Impacts

Site B would be slightly farther than Site A from Interstate 80 and from the nearest existing rail line. This would increase the length of a rail line to the proposed facility by about 2 percent, and would increase the construction activity by a proportionate amount. In addition, the length of travel for construction materials and personnel would also increase during the additional construction. However, this would not be expected to increase the traffic density. The additional distance would not increase the significance of the associated air-quality impacts, which would be small in either case.

5.3.3.2 Impacts During Operations

Site B would be slightly farther than Site A from Interstate 80 and from the nearest existing rail line. This would increase emissions from transportation by an additional 1.6 km (1 mile) or around 2 percent of the distance to the proposed PFSF. Ambient-air concentrations of pollutants along the road or rail line would not be noticeably different; but those routes and associated emission points would extend about 1 km (3,300 ft) farther. This extension would not change the significance level of the air quality impacts, which would be small in either case.

5.3.4 Mitigation Measures

The mitigation measures described in Section 4.3.4 for construction and operation of the proposed PFSF would also be applicable to the proposed transportation facilities in Skull Valley. However, because of the proximity of transportation facility construction to Interstate-80 and the large number of individuals on Interstate-80 who could be exposed to fugitive dust from the construction site, additional mitigation measures are warranted. These measures are described below.

5.3.4.1 Construction Impacts

Air quality impacts from construction of the proposed rail line or ITF would mainly involve fugitive dust resulting from earthmoving activities. Routine sprinkling of disturbed surfaces with water when winds are blowing toward Interstate 80 would reduce human exposure to airborne particulate matter. The application of surfactants or surface crusting agents would also be effective in reducing dust emissions from construction areas. Minimizing the size (i.e., acreage) of active construction areas and/or installing barriers to shield active construction areas from the wind are two additional measures that would reduce the total amounts of dust emitted from the construction site. The Cooperating Agencies propose that PFS be required to develop a program to control fugitive dust during construction that includes methods such as one or more of those described above (see Section 9.4.2).

5.3.4.2 Impacts During Operations

Impacts of operations at the proposed PFSF site, an ITF, and a rail line are similar; all involve small emissions of air pollutants from fossil-fuel combustion. Impacts would be small and could not be reduced appreciably by additional mitigation measures, such as enhanced vehicle emission controls or extensive power engine maintenance campaigns.

5.4 Ecological Resources

The potential impacts on ecological resources of site preparation, construction, and operation of facilities for transporting SNF to the PSF site are evaluated and discussed in this section. Areas of potential concern include construction and operation activities that would disturb or remove vegetation, animals, and wetlands either temporarily or permanently. Direct losses from land disturbance are quantified by determining the amounts of habitat lost as a result of construction activities. Potential impacts on species of special concern, as identified in Section 3.4.3, that are found to reside on or use the areas necessary for the transportation facilities are also evaluated.

Construction and operation of the proposed transportation facilities may impact wildlife including mammals, birds, and nesting raptors. With the implementation of appropriate mitigation measures, impacts as a result of the Skunk Ridge rail line are expected to be small for all these species. If the heavy haul truck transportation alternative were chosen, much less habitat for these species would be disturbed, and, therefore, it would also result in small impacts.

5.4.1 Construction Impacts

5.4.1.1 Vegetation

Direct impacts from construction would include clearing existing vegetation and modifying wildlife habitat. Some of the area to be cleared would be covered by the rail line and rail siding at Skunk Ridge; part of the cleared area would be revegetated. None of the area to be cleared at the ITF near Timpie would be revegetated. In addition, fugitive dust from construction could have indirect effects on vegetation. Construction of the rail corridor or ITF near Timpie is expected to have only a small impact on vegetation and could have a beneficial impact (due to the use of native species) along the Skunk Ridge rail line corridor when revegetation occurs following construction.

Table 2.4 presents the amount of land that would be cleared for each of the transportation alternatives. Construction of the Skunk Ridge rail line corridor, the preferred transportation alternative, would require clearing vegetation and grading soil from a total of 314 ha (776 acres) to reach the preferred site (Site A). For this option approximately 63 ha (155 acres) of desert shrub/grass vegetation would remain cleared for the life of the facility; the remaining cleared area (251 ha [621 acres]) would be replanted following construction primarily with native vegetation. For the heavy-haul truck option the area to be cleared would be 4.5 ha (11 acres) for the ITF near Timpie, none of which would be revegetated. The area to be used for the ITF is the location of the existing Union Pacific rail line, and, as such, it is previously disturbed; hence, any construction activities in that area would have only a small impact on native vegetation.

There are no unique habitats that would be cleared for either the ITF near Timpie or the Skunk Ridge rail corridor. Much of the vegetation that would be cleared includes non-native species such as cheatgrass. Most of the land that would be cleared for the Skunk Ridge rail line corridor would be replanted with native vegetation following construction. The revegetation plan would be similar to that discussed in Section 4.4.1. A detailed revegetation plan would be developed in consultation with BLM during construction (PFS/RAI2 1999). A seed mixture that could be used for revegetation is listed in Table 5.2. All of the species in this table, except prostrate Kochia, are native species, and all except Lewis flax have a high fire tolerance (USDA NRCS 1999). The revegetation plan would comply with the latest BLM guidelines on revegetation in effect at that time for details such as soil preparation, type of seed mix, fertilizing, time of year to plant, and watering frequency (see Section 5.4.4.1).

Table 5.2. Potential seed mixture for rehabilitation of the area cleared for the rail line

Scientific name	Common name	Planting rate kg/ha (lb/acre)
Elymus smithii	Western wheatgrass	3.6 (3)
Stipa hymenoides	Indian rice grass	2.4 (2)
Linum lewisii	Lewis (or blue) flax	1.2 (1)
Atriplex canescens	Four winged saltbush	0.6 (0.5)
Kochia prostrata	Prostrate Kochia (prostrate summer cypress)	0.6 (0.5)

Fugitive dust would be generated during construction, as discussed in Section 5.3. The small, short-term, incremental amount of dust that would be generated from construction activities is expected to only have a small impact on vegetation since vegetation growing in such environments is not sensitive to dust.

5.4.1.2 Wildlife

During the construction of the proposed transportation facilities, wildlife, such as ground squirrels, kangaroo mice, and small reptiles could be displaced or lost due to the excavation of soils. There would be a loss of nest sites for certain species of birds and burrow sites for species such as gophers and burrowing owl. This reduction of animals and wildlife habitat would have a slightly negative impact on the abundance of prey for predatory species, such as hawks, eagles, owls, and fox species. However, the permanently disturbed area is expected to have only a small negative impact on available wildlife habitat. Even when considering the longer rail line route to Site B, less than 0.3 percent of Skull Valley would be disturbed due to the construction of the railroad corridor. If the heavy haul truck alternative were chosen, the amount of habitat disturbance would be reduced to less than 0.01 percent of Skull Valley, as only the ITF area would require clearing [approximately 4.5 ha (11 acres)].

Because wildlife in Skull Valley do not exclusively use any particular portion of the valley, the presence of the new rail line would not significantly contribute to habitat fragmentation, segregation, or interruption of habitat connectivity. Also, because there are no clearly defined migration or seasonal use patterns for the wildlife in Skull Valley, the new rail line would not significantly affect the movement of wildlife in the valley. The physical presence of the railroad may help to keep the feral horses up on the mountain within the herd area, so there may be a slight beneficial impact to horses from the proposed project.

The truck transportation option for Skull Valley would include an ITF near Timpie. There are no unique habitats that would be cleared for the ITF near Timpie; therefore, impacts to wildlife are expected to be small. Because no road widenings are proposed for the Skull Valley Road alternative, impacts to listed species dependent on springs and wetlands to the north of the facility are not expected. These species would include mink, ringtail, speckled dace, Great Basin spadefoot, bobolink, common yellowthroat, snowy plover, Caspian tern, American white pelican, herons, white-faced ibis, and long-billed curlew.

5.4.1.3 Wetlands

No wetlands would be disturbed by construction of the Skunk Ridge transportation corridor or the ITF near Timpie (see Section 3.4.2.2) as none exist in either place. The largest wetland area in Skull Valley, Horseshoe Springs, is approximately 11 km (7 miles) from the rail corridor, nearly 16 km (10 miles) from the ITF near Timpie location, and approximately 335 m (1,100 ft) from Skull Valley Road (see Figure 3.8). Several smaller springs are located near Skull Valley Road. The impact of construction on wetlands for transportation facilities would be small since there are none on or near any of the proposed construction areas.

5.4.1.4 Perennial and Ephemeral Streams

The construction of the rail line or the ITF near Timpie would have a small impact on streams. Runoff from the ITF near Timpie would not enter any streams and, thus, would have a small impact on them.

The proposed Skunk Ridge rail corridor would cross 32 ephemeral or intermittent drainages (see Section 2.1.1.3). Depending upon the time of year that rail construction occurs, disturbed soils entrained by these ephemeral desert washes could create minor short-term increases in the turbidity of any water in such streams. These impacts on streams would be small. A CWA Section 404 permit from the Corps of Engineers would be needed prior to construction of those sections of the Skunk Ridge rail corridor that would use culverts to cross these areas. Necessary permits are further discussed in Section 1.6 of this FEIS.

The proposed Skunk Ridge rail line would cross many ephemeral streams. These are seasonally wet and important to many wildlife species, providing water to roaming mammals, such as pronghorn antelope and mule deer. It is important to protect any streams that may occur along the corridor. The new rail line would be designed such that natural drainages would be preserved; hence, any impacts to wildlife associated with a reduction in seasonally wet areas would be expected to be small.

5.4.1.5 Threatened and Endangered Species and Other Species of Special Concern

There are no plant species of special concern that occur in the area of the Skunk Ridge rail line or the ITF near Timpie. Thus, construction of these facilities would have no affect on special concern plant species.

As discussed in Section 3.4.3.2, peregrine falcon populations have recently increased and continue to increase in Utah and in the United States. The species is now considered recovered nationally and has been removed from the Federal list of threatened and endangered species. The species is, however, still listed by the state of Utah as endangered. Peregrine falcons nesting in this area could use the ITF site for foraging. The construction of the ITF would have a small impact to peregrine falcons because only a small amount of land would be altered at the ITF and it is unlikely that the falcons' foraging base (other birds and occasionally small mammals) would be significantly impacted.

Construction of the ITF should not disturb the falcons at the Timpie Springs nesting tower even during breeding season. Falcons have successfully bred at that location nine of the last 13 years, even with the nearby Cargill salt processing plant and train and highway traffic. Thus, the birds are acclimated to disturbances from plant activities and traffic. The ITF would be much further away than the salt processing plant so that impacts due to disturbances would be greater from the salt plant than from the ITF. Only if the ITF were within one mile of the nest site would the state recommend curtailing activity during the breeding season (UDWR 1997a). Therefore, the impacts of disturbances from construction on the breeding success of the falcons at the Timpie Springs nesting tower would be small.

Increased traffic from construction of the ITF at Timpie, even in combination with water level changes in the Great Salt Lake, would have a small impact on peregrine falcons. As discussed in Section 5.5.1.2, impacts of the construction of a ITF near Timpie on the local transportation system are expected to be small. A maximum of approximately 100 additional vehicle trips per day would occur on Interstate 80 (about 27 truck trips per day for three months of the 12-month construction period and about 70 vehicles for the construction force during the entire 12-month construction period). This increase amounts to an approximately 1.2 percent greater volume of traffic on the interstate than the 1995 level. There would be no increase in train traffic during construction.

It is possible that the water level in the Great Salt Lake could change during the year when the ITF is being constructed. Since 1845, the water level in the Great Salt Lake has varied from just over 4,190 to 4,212 feet above sea level (USGS 2001). The highest level, 4, 212 feet, has occurred as recently as 1985. Such elevation changes could result in wetlands becoming established in different places around the lake, thus, creating new habitat for some peregrine prey species and, consequently, new foraging areas for the peregrines. Changes in the water level of the Great Salt Lake and habitats around it will occur whether or not the ITF is built. Collisions of falcons with traffic have historically been very rare. If new wetlands become established close to I-80 due to a change in the elevation of the Great Salt Lake, and if those wetlands are used by the falcons for foraging, there could potentially be an increase in the number of collisions between peregrines and vehicles. However, since the elevation of the Great Salt Lake has changed regularly over time and since falcon collisions have historically been uncommon, collision of falcons with traffic would be expected to still be uncommon even when the lake level again changes. As noted above, construction of the ITF would increase total traffic along I-80 by only 1.2 % over 1995 levels, a small increase that should not result in many additional collisions of falcons with traffic even if they are foraging closer to the road. Furthermore, since the falcon population continues to increase, even a few collisions would not result in a significant drop in population levels. Therefore, the impact on falcons of traffic from constructing the ITF even in conjunction with a change in water level of the Great Salt Lake would be small.

As documented in Section 3.4.3.2, raptors (i.e., hawks, falcons, owls, and eagles) feed and nest throughout the area of the proposed rail corridor (Stone & Webster 1998; UDWR 1997a; PFS/ER 2001). Some of these birds are State or Federally listed (e.g., ferruginous hawk, short-eared burrowing owl). Another listed predatory bird, the loggerhead shrike, is also found in Skull Valley. Construction of the rail line could disturb or destroy nesting habitat important to these species. However, with appropriate mitigation measures, impacts to these species are predicted to be small.

Even though hawks nest in trees along Skull Valley Road (Stone & Webster 1998; UDWR 1997a; PFS/ER 2001), the heavy-haul truck alternative is expected to only have small impacts to these birds because no road widening improvements that could impact nest trees are planned for Skull Valley Road.

Habitat for mammals, including the kit fox (a BLM-listed sensitive species) would be affected due to construction of the Skunk Ridge rail line. The kit fox may be displaced or forced to change movement patterns. Since the amount of affected habitat is a very low percentage of the available habitat in Skull Valley, impacts to the kit fox are predicted to be small.

Skull Valley pocket gophers may also be displaced or destroyed as a result of the construction of the Skunk Ridge rail line. However, since the gophers are widespread in Skull Valley, the population would not be significantly affected even if the individuals in impacted burrows were to be lost (Pritchett 2001). With the implementation of surveys prior to construction, anticipated impacts to these gophers would be small.

5.4.2 Impacts During Operations

5.4.2.1 Vegetation

There would be no direct impacts on vegetation during operation of the Skunk Ridge rail corridor or ITF. Other potential impacts for the rail line corridor include additional wildfires from equipment sparking (PFS/RAI2 1999) as has been reported to occur elsewhere in the west (AmeriScan 1999) (see Section 5.8.4).

Since revegetation of the rail corridor after construction would be required to follow BLM's fire management plan for Skull Valley (see Section 3.4.1.1), it would be possible for the rail corridor to function as a green strip to help prevent the spread of both wildfires and those caused by operation of the rail line. Planting a mixture of primarily native species along the corridor as listed in Table 5.2 would have a beneficial impact on the local ecosystem and biodiversity. Thus, the planting of species that both retard fires and also rehabilitate areas where invasive annuals are growing could benefit vegetation by increasing biodiversity and improving local ecosystems.

During operation of the rail line PFS would need to control noxious weeds and other non-native species within the rail corridor. PFS would use herbicides to control noxious weeds. EPA's labeling requirements control when and under what conditions herbicides can be applied, mixed, stored, or used (e.g., wind speed, relative humidity, air temperature, chemical persistence, time since last rainfall). By following these requirements, PFS would ensure that the impacts on non-target vegetation from the use of herbicides during the operational lifetime of the rail line would be small.

5.4.2.2 Wildlife

Operation of an ITF near Timpie would have small impacts on wildlife that occur near it or that use the Great Salt Lake.

Birds may be attracted to the ITF for perching and potential nesting because of limited perching and nesting sites in the area. However, because of the disturbed nature of the area, prey species should be limited in number, making the ITF less attractive to birds. The potential for transportation accidents severe enough to damage a cask and release radioactive material is discussed in Section 5.7.2 of the FEIS. Because of the consistently conservative assumptions used to analyze those potential impacts, annual and cumulative radiological impacts of transporting SNF to the proposed PFSF are expected to be small. Therefore, no contamination of the Great Salt Lake would be expected to occur, and there would be no impacts on its wildlife either directly or via groundwater contamination.

The Skunk Ridge rail option would bisect areas between the western edge of Skull Valley and the Cedar Mountains. There are no wintering or fawning areas for pronghorn antelope or mule deer along this route; however, both species use these areas. Truck or rail traffic could cause roaming wildlife to sometimes adjust their movements and migration patterns. However, these impacts are expected to be small. Based on the proposed location of the right of way and the projected speed of the trains, there should be no direct negative impacts to wild, free-roaming horses from the proposed project. The physical presence of the railroad may help to keep the horses up on the mountain within the herd area, resulting in a slight beneficial impact to them from the proposed project.

As stated above, during operation of the rail line PFS would use herbicides to control noxious weeds and other non-native species within the rail corridor. EPA's requirements control when and under what conditions herbicides can be applied, mixed, stored, or used (e.g., wind speed, relative humidity, air temperature, chemical persistence, time since last rainfall). By following these requirements, PFS would ensure that the impact of herbicides would be small on wildlife and water resources during the operational lifetime of the rail line.

Wildfires are frequent occurrences in Skull Valley. If the rail option is implemented for the PFS project, there may be an increase in the frequency of these fires (see Section 5.8.4). Certain wildlife species that are not very mobile (i.e., small mammals and certain nesting birds) could be killed as a result of the increased frequency of fires. More mobile species would be able to avoid the fires. Cheatgrass has become a dominant plant species in Skull Valley. This habitat is considered a threat to the desert populations of the golden eagle in north-central Utah, because cheatgrass invasion in combination with wildfires results in the reduction of jackrabbit populations (Bednarz 1999; USDI 1996; Keller et al. 1998). Jackrabbits are an important food source for golden eagles. If the frequency of wildfires does not increase significantly above current levels, impacts to small mammals and those species dependent on small mammal prey species would be expected to be small because their species and their habitat would not be significantly affected by operation of the rail line. As set forth in Section 5.4.2.1, revegetated areas of the rail line corridor may function as a green strip to help prevent the spread of wildfires. Accordingly, impacts to small mammal prey species and, consequently, golden eagles are expected to be small.

5.4.2.3 Wetlands

There are no wetlands that would be impacted by operation of the Skunk Ridge transportation corridor. The major wetland area in Skull Valley, Horseshoe Springs, is approximately 11 km (7 miles) from the Skunk Ridge transportation corridor. There are no wetlands along the rail corridor itself. Thus, the impact on wetlands of corridor operation would be small.

Impacts to the wetlands along Skull Valley Road that may be caused by increased road traffic and heavy haul trucks are predicted to be small. The largest wetland is at Horseshoe Springs, 335 m (1,100 feet) west of Skull Valley Road, and it would not be impacted by traffic on the road.

5.4.2.4 Perennial and Ephemeral Streams

The operation of the rail line or an ITF near Timpie would have a small impact on streams. The proposed Skunk Ridge rail corridor would cross a number of ephemeral or intermittent drainages, but operation of the rail line would have only a small impact on them because the rail line would be designed such that natural drainages would be preserved. There are no perennial or ephemeral streams near the site for the ITF.

5.4.2.5 Threatened and Endangered Species and Other Species of Special Concern

There are no plant species of special concern that occur in the area of the Skunk Ridge rail line or the ITF near Timpie. Thus, the impact on special concern plant species of operating those facilities would be small. Listed wildlife species, from time to time, would need to adjust their movement patterns due to either the rail line or heavy-haul transport. This impact is considered to be small.

Operation of the ITF at Timpie should not disturb the falcons at the Timpie Springs nesting tower even during the breeding season. Falcons have successfully bred at that location nine of the last 13 years, even with the existing disturbances from the nearby salt processing plant and the nearby train and highway traffic. The ITF would be much farther away than the salt processing plant so that impacts due to disturbances would be greater from the salt plant than from the ITF. Only if the ITF were within one mile of the nest site would the state recommend curtailing activity during the breeding season (UDWR 1997a). Therefore, the impacts of disturbances from operation of the ITF on the breeding success of the falcons at the Timpie Springs nesting tower would be small.

During ITF operation, there would be less traffic on Interstate 80 from the project than during construction of the facility (see Section 4.5.2.6). Slow moving, heavy haul trucks would move casks down Skull Valley Road from the ITF to the main facility. Train traffic could increase by up to two trains per week (see Section 2.2.4.2). The peregrines have adjusted to existing train and highway traffic, so that this small increase in traffic should not result in additional collisions with traffic. Even if there were water level changes in the Great Salt Lake, as discussed in Section 5.5.1.2, the impact on falcons of traffic from operating the ITF would be small.

5.4.3 Impacts at the Alternative Site B

Direct and indirect impacts of construction and operation of either transportation option to Site B would be essentially the same as those for the proposed site (Site A) as discussed in Sections 5.4.1 and 5.4.2.

5.4.3.1 Vegetation

The Skunk Ridge rail corridor to the alternative site (i.e., to Site B) on the Reservation would require 10 ha (24 acres) more land to be cleared than the route to Site A for a total of 324 ha (800 acres). While the impacts along this transportation corridor would be similar to those described in Section 5.4.1 for the route to Site A, the spatial extent of such impacts would be somewhat greater but still small.

5.4.3.2 Wildlife

The potential impacts to wildlife species as a result of construction and operation of rail line or the heavy haul truck route would be similar to those of the proposed action. With the appropriate mitigation employed, all potential impacts are predicted to be small.

5.4.3.3 Wetlands

The impacts on wetlands of the Skunk Ridge rail corridor to the alternative site (i.e., to Site B) on the Reservation would be similar to those for Site A (i.e., they would be small).

5.4.3.4 Perennial and Ephemeral Streams

The impacts on perennial and intermittent streams of the Skunk Ridge rail corridor to the alternative site (i.e., to Site B) on the Reservation would be similar to those for Site A (i.e., they would be small).

5.4.3.5 Threatened and Endangered Species and Other Species of Special Concern

The impacts on plant and wildlife species of special concern of the Skunk Ridge rail corridor to the alternative site (i.e., to Site B) on the Reservation would be similar to those for Site A (i.e., they would be small).

5.4.4 Mitigation Measures

5.4.4.1 Vegetation

PFS has proposed the use of BMPs described in Table 2.7 for construction of the rail line or ITF near Timpie, and the Cooperating Agencies recommend that these BMPs be implemented. While the BMPs in Table 2.7 include temporary seeding during construction, a mixture of plant species such as those listed in Table 5.2 could be planted along the rail corridor to revegetate the rail corridor following construction. All of the species listed in Table 5.2, except prostrate Kochia (*Kochia prostrata*), are native species, and all except Lewis flax (*Linum lewisii*) have a high fire tolerance (USDA NRCS 1999). Planting a mixture of primarily native species, as listed in Table 5.2, along the rail corridor would have a beneficial impact on the local ecosystem and biodiversity. In addition, guidelines currently used by BLM, such as the Interagency Forage and Conservation Planting Guide for Utah, EC 438, or other current guidelines, could be applied in developing a plan for restoring and revegetating areas affected by construction of the rail transportation facilities. In view of the above, the Cooperating Agencies propose that PFS be required to consult with BLM before initiating construction, to develop a plan for restoring and revegetating areas affected by construction of the rail transportation facilities, including greenstrip seed mix specifications (see Section 9.4.2). Additionally, the Cooperating Agencies recommend that PFS consult qualified personnel who are familiar with the local area, including staff at the Forest Service's regional facilities and area universities who could help identify native species to use. (See Section 4.4.5 for a discussion of the use of native species in revegetation.)

PFS would need to control or eradicate noxious weeds within the rail line right-of-way. Noxious weeds could be controlled by using herbicides, biological controls, or mechanical clearing. In general, the use of herbicides should be restricted to as small an area as necessary. Herbicides must also be applied at the proper stage of plant growth to be effective (Whitson 1998). Herbicides must be used in compliance with all applicable laws, including EPA's labeling instructions (40 CFR 156) for prescribed environmental conditions (e.g., wind speed, relative humidity, air temperature, chemical persistence, time since last rainfall). The Cooperating Agencies propose that PFS be required to consult with BLM prior to construction in order to develop an adequate plan for monitoring and controlling noxious weeds during the operational lifetime of the proposed rail line (see Section 9.4.2). The Cooperating Agencies recommend that this consultation with BLM be coordinated with BIA regarding the use of herbicides during operation of the proposed PFSF. The Cooperating Agencies also propose that PFS be required to include in the plan an approved list of herbicides and consideration of non-chemical (e.g., biological) means of controlling noxious weeds (BLM 1991). The Cooperating Agencies also recommend that the list incorporate BLM's most recent standard stipulations for chemical treatment (i.e., spraying) of vegetation (e.g., see Appendix 5 in BLM 1983).

5.4.4.2 Wildlife

The Cooperating Agencies propose that PFS be required to survey the area within 30 m (100 ft) of construction of the proposed rail line or ITF site, prior to construction, for Skull Valley pocket gopher burrows and kit fox dens to minimize potential for loss of wildlife during construction (see Section 9.4.2). The Cooperating Agencies propose that PFS be required to consult with BLM regarding the appropriate timing of the surveys (see Section 9.4.2). In addition, in order for BLM to determine the significance of the location of any gopher burrow or kit fox den identified by such a survey, the Cooperating Agencies propose that PFS be required to notify BLM immediately if the surveys identify the presence of these species (see Section 9.4.2). BLM would determine the significance of the location (e.g., is it within the middle of a gopher town, or an isolated burrow on the edge of a gopher town). Specific mitigation measures would depend on the locations identified and BLM's determination, and could range from relocation of the rail line (e.g., if it is within the middle of a gopher town) to allowing construction to continue (e.g., if the rail line only intersects the outside boundaries of a gopher town).

To help minimize impacts to the movements of pronghorn antelope, mule deer, and other wildlife species, the Cooperating Agencies recommend that provisions be made in the railroad design to allow for a number of wildlife crossings, over or under the rail line. The final design for such crossings should be developed in consultation with BLM as part of the right-of-way approval process.

Activities associated with rail line construction could affect nesting success or raising young birds. Therefore, the Cooperating Agencies propose that PFS be required to survey the area within 0.8 km (0.5 mile) of the new rail transportation corridor prior to construction for raptor nests (including hawks, owls, eagles, and the loggerhead shrike) (see Section 9.4.2). If active nests are present in these areas, construction activities should be curtailed or restricted during the period from April 1 to August 15 (Stone & Webster 1998; UDWR 1997) to avoid any impacts on nesting success and rearing young. If active great horned owl or golden eagle nests are present in these areas, construction activities should be similarly curtailed or restricted during the period from February through August (UDWR 1997). In order for BLM to provide appropriate guidance on the above matters, the Cooperating Agencies propose that PFS be required to consult with BLM regarding the appropriate timing of the surveys and to notify BLM immediately if the surveys identify the presence of these species (see Section 9.4.2).

In addition, in order to avoid impacts to Federally-listed or endangered species or State of Utah or BLM-sensitive species during construction, the Cooperating Agencies propose that PFS be required to notify BLM and cease construction activities immediately if PFS identifies any such species during construction of the transportation facilities related to the proposed PFSF.

5.5 Socioeconomic and Community Resources

The potential socioeconomic impacts and impacts to community resources of two local transportation options have been assessed: (a) constructing and using a proposed new rail line from Skunk Ridge to the proposed PFSF and (b) constructing a new ITF near Timpie and using heavy-haul vehicles on the existing Skull Valley Road. Both the direct and indirect impacts to socioeconomic and community resources during construction and use of these local transportation options to the proposed PFSF are primarily associated with workers who might move into the area; use of heavy-haul vehicles on Skull Valley Road or the use of the rail corridor also result in impacts. Impacts to the socioeconomic and community resources of the Skull Valley Band and their Reservation are indistinguishable from those to the remainder of Tooele County with the exceptions of population, land use, and economic structure. Impacts specific to the Skull Valley Band, as compared to the remainder of Tooele County, are noted in the following discussion, as appropriate.

These impacts are summarized in Table 5.3, and as discussed in the following paragraphs, would be small.

Table 5.3. Potential impacts to socioeconomic and community resources during the construction and use of new transportation facilities in Skull Valley

	Significance level of potential impact	
Category of potential impact	**New rail siding and corridor**	**New ITF near Timpie**
Population	Small	Small
Housing	Small	Small
Educational system	Small	Small
Utilities	Small	Small
Solid waste	Small	Small
Transportation and traffic	Small	Small
Land use	Moderate	Small
Economic structure	Small (but beneficial)	Small (but beneficial)

The overall approach to the assessment of impacts to socioeconomic and community resources is described in Section 4.5. It involves the development of an estimate of the number of construction workers that might move into the area. Both direct construction jobs and indirect jobs are considered. These numbers are used to determine the potential increase in the existing population, the demand on local housing, and the number of new children that might be enrolled into the existing school system. These increased numbers of people in the local area serve as the basis for determining impacts to socioeconomic and community resources during all phases of construction. The analytical approach and method (of determining the potential number of in-moving workers) are described for the new rail line and the alternative ITF in Sections 5.5.1 and 5.5.2, respectively.

5.5.1 Construction Impacts

5.5.1.1 New Rail Line from Skunk Ridge

During the 14-month construction period for the rail line and its associated siding, an estimated peak work force of 125 workers would be required for various tasks. The bulk of the manpower would be for earthwork. This portion of the work is estimated to take approximately 109 workers including equipment operators, laborers, electricians, iron workers, concrete finishers, and construction supervision staff. The remainder of the work involves preparing the route for the rail line and laying the track; approximately 16 workers would be required to support the track-laying machine. The number of workers required to operate the proposed rail line is incorporated into the work force for operation of the proposed PFSF itself (see Section 4.5.2).

Following the same approach and using the same assumptions in the assessment of socioeconomic impacts of constructing the proposed PFSF (see Section 4.5.1), if 30 percent of the direct workforce (approximately 38 workers) moves into the area, and approximately 60 percent of those (23 workers) were accompanied by families (with a family size of 2.87), the local population would increase by 81 residents in 38 households due to direct employment. This translates into 15 workers unaccompanied by family, 23 workers accompanied by family, and 43 family members of construction workers. The construction of the rail line would also result in approximately 62 indirect jobs, with six of those workers moving into the area during the construction period. Assuming that 60 percent of these workers bring families and that the average family size would be 2.87, an upper bound of 14 new residents in six households would be expected as the result of indirect employment. Combining the above direct and indirect in-moving persons yields a total of 95 new residents in 44 households as an upper bound. Unaccompanied workers would live in 17 of these households while the other 27 households would consist of workers and their families. Based on the Tooele County average of 0.7 school aged children per household (Governor's Office of Planning and Budget, Economic and Demographic Projections, 1997; http://www.governor.state.ut.us/dea/ demographics/household.htm), it is expected that 19 additional children would be added to local schools.

Population. Impacts of construction of the rail line to the population levels of Tooele County are expected to be small. Workers who move to the impact area during construction of the new rail line would probably be distributed in communities in the eastern portion of Tooele County (e.g., Grantsville and Tooele) because they are closest to the proposed rail line and to housing and have vacant housing units available for rent and sale. It is unlikely that any in-moving workers and their families would locate in Skull Valley itself since there are few, if any, housing units available; it is possible that members of the Skull Valley Band who return to Skull Valley for employment during construction of the proposed rail line might decide to live on the Reservation.

The precise distribution of in-movers would be determined by a number of factors, including proximity to the proposed rail line and the availability of housing and public services. The 95 new residents used as an upper bound in this analysis would represent an increase of 0.3 percent to the 1996 population of Tooele County. If all of these in-migrants located in either Grantsville or Tooele, the population increase would be 1.9 percent in Grantsville or 0.6 percent in Tooele. While growth of this magnitude could be readily accommodated without disrupting the affected communities, it is very unlikely that all new residents would settle in a single community.

Housing. Any housing impacts from construction of the rail line are expected to be small. Construction workers would need to seek housing in nearby towns because BLM will not permit camping or temporary trailers on public lands. The 44 new households used as an upper bound in this analysis would represent 12.6 percent of the vacant housing units, not counting housing units in Wendover or Dugway, that were for sale or rent in Tooele County in 1990 (the most recent year for which data are available). Even if all project-induced in-movers settled in either Grantsville or Tooele, which is highly unlikely, the number of housing units needed would not exceed the number of vacant units for sale or rent in either of these communities. Accordingly, any housing impacts are expected to be minimal.

The Skull Valley housing market is isolated by geography, and part of the valley is also isolated by its Reservation status from the rest of Tooele County. The Reservation itself is not a normal housing market. The housing market on the Reservation has the following unique characteristics. Any housing built or placed on the Reservation may be owned only by members of the Skull Valley Band. A Band member seeking to build or place housing on the Reservation must obtain approval from the Skull Valley Band General Council. Any transfer of ownership of a housing structure or a building on the Reservation must also be approved by the Council. The only persons who may reside on the Reservation itself are Band members, spouses of Band members, and their children. The values of existing houses do not include the value of underlying land, which remains in trust for the Skull Valley Band. Housing prices also reflect the strong presence of Federal housing programs. It is not clear whether there is an active housing market on the Reservation.

Impacts on Reservation housing prices would partly depend on whether the proposed PFSF would attract Band members back to the Reservation and partly on the financing mechanisms used to construct housing. If some Band members moved back to the Reservation to take jobs at the proposed PFSF, there might be some increase in demand for housing on the Reservation, but whether returning Band members would simply build new housing, with no effect on the nominal value of existing homes, is not known. In any case, due to the small number of workers expected to move back to the Reservation, the impact on housing prices is expected to be small. Similarly, it is not anticipated that the presence of the proposed facility would deter Band members from moving back to the Reservation, and thereby potentially depress housing prices. It is equally likely that members would move back to be near employment opportunities, as is the case with, for example, nuclear power plants workers. These workers are likely to be more concerned with the ease of commuting to work, rather than potential adverse environmental impacts of the proposed PFSF. In summary, given the above characteristics of the housing market on the Reservation, and the small number of workers expected to move back to the Reservation, the proposed PFSF project would likely have only a small effect on the housing market on the Reservation.

Education. The impacts to the existing education system during construction of the rail corridor are expected to be small. The addition of 19 new school-age children would increase enrollment in Tooele County by only 0.23 percent. Even in the highly unlikely event that all in-movers would locate in a single community, the increases in enrollment would be relatively small. For instance, if all new students were enrolled in elementary school in the city of Tooele, there would be an increase of approximately 1 percent, 2.6 percent if all new students were enrolled in the Tooele Junior High School, or an increase of 1.3 percent if all new students were enrolled in the Tooele High School; similarly, if all the new students were enrolled at schools in Grantsville, the increases would be 2.5 percent in the elementary school, 3.6 percent in the middle school, or 2.4 percent in the high school. It should be noted, however, that the Tooele County School District has already embarked on a significant expansion of its capacity, so that any additional increase would not place demands on the system that have not already been anticipated.

Utilities. The impacts of constructing the rail line on the provision of water and other utilities within Skull Valley, including impacts to the Skull Valley Band, are expected to be small. The addition of 45 new households and 129 new residents is not expected to strain existing utilities within the impact area, since most if not all of those in-movers would be expected to occupy currently vacant housing units in Rush Valley or Tooele Valley already hooked up to utilities.

Solid and sanitary waste. Impacts to solid waste management are expected to be small to non-existent. Clearing of the right-of-way would involve the removal and disposal of vegetation along the

12-m (40-ft) wide rail bed, at cut and fill areas, and at soil stockpile locations within the temporary use areas. Woody vegetation would be shredded and scattered in place. Sanitary wastes would be managed with conventional systems, such as portable toilets.

Transportation and traffic. Impacts to transportation by construction of the rail line are expected to be small. Construction of the rail line and siding would require the movement of large quantities of excavated soils and ballast and sub-ballast as well as workers to construction areas. It is anticipated that most materials and workers would travel to the site of the proposed rail siding by way of Interstate 80. PFS has indicated that materials and workers would travel to each point of construction by way of the rail line as construction proceeds along the proposed route. Nothing would prevent PFS from transporting materials and workers on unimproved roads (i.e., dirt) that are adjacent to the rail corridor. If PFS uses these dirt roads frequently or to transport heavy materials, the roads could degrade and become impassable because of the type of soils in the area (see Section 3.1). If it becomes necessary to use the dirt roads, PFS could develop a plan in consultation with BLM to minimize the impact. The Cooperating Agencies propose that PFS be required to notify BLM prior to any use of these unimproved roads that could lead to their degradation, and to consult with BLM to develop an adequate plan to minimize any degradation of such roads.

As noted in Section 2.1.1.3, an attempt would be made to balance the expected volume of cuts and fills to minimize the need for additional fill material. With such an effort, a surplus of approximately 196,000 m^3 (256,000 yd^3) of material could be generated. In addition to the movement of excavated soils, which would have minimal impact on transportation due to the intent to keep such materials near the point of generation, construction of the proposed rail line and siding would require approximately 245,000 m^3 (320,000 yd^3) of ballast and sub-ballast (composed of crushed gravel or rock) to be obtained from one or more existing commercial gravel pits in the area. Assuming a per-truck capacity of approximately 15.3 m^3 (20 yd^3) (PFS/SAR 2001) for movement of the ballast and sub-ballast, a total of approximately 32,000 truck trips would be required to transport the ballast and sub-ballast (a truck trip, or vehicle trip, is defined as a single one-directional vehicle movement; hence, a vehicle arriving and departing the point of delivery constitutes two vehicle trips). Assuming that these 32,000 trips are made evenly throughout 12 months of the 14-month construction period, there would be approximately 134 truck trips per day (67 trucks going each way on Interstate 80 to and from the point of ballast and sub-ballast delivery) or approximately 13 vehicles per hour.

In addition to ballast and sub-ballast deliveries, a peak construction work force of 125 workers would commute to and from the construction site in individual passenger vehicles and light trucks on a daily basis. These workers could account for an increase of 250 vehicle trips per day on Interstate 80 during construction of the rail line and siding. All together, construction of the rail line and siding could result in an increase of 384 vehicle trips per day on Interstate 80 (250 vehicle trips per day for the construction workers and 134 vehicle trips per day for the ballast and sub-ballast delivery). This increase amounts to approximately 4.5 percent greater use of Interstate 80 than had been experienced in 1995 (see Section 3.5.2.4). This additional traffic volume would have a negligible effect on the level of service on Interstate 80 but could have temporary adverse effects on the movement of traffic onto and off of the interstate. This adverse effect on feeders to and from Interstate 80 also results from delivery trucks moving at a slower rate of speed before entering and after leaving Interstate 80 than other traffic, requiring other traffic to reduce travel speed.

Land use. Impacts to current land use from construction of the rail line are expected to be moderate. The proposed right-of-way between Skunk Ridge and the proposed facility crosses public land administered by BLM's Salt Lake Field Office. Construction of the rail line could result in some reduced use of this resource by members of the public (Section 5.8.3). In addition, some grazing activities on the Eightmile and Black Knoll Pastures of the Skull Valley grazing allotment might be temporarily curtailed during construction of the rail line from Skunk Ridge but should return to pre-construction levels following construction.

The proposed rail route through Skull Valley would disrupt livestock movement between bench areas and cheatgrass flats. Since water is predominantly located west and above the proposed route in most areas, grazing would be intensified along the bench areas, resulting in greater utilization and potential rangeland degradation. Wild horse use in this area is also quite significant, and the proposed rail line could have a similar effect on their use of these bench areas.

The proposed route would cross two Pasture and Allotment division fences. The fences run east-west across the valley. The route would also cross several unimproved roads which are equipped with cattle guard crossings to prevent livestock movement between pastures. PFS plans to include cattle guards along the rail route wherever the route crosses Pasture and Allotment division fences. Three livestock water pipelines also cross the rail route line; provision would be made to keep them serviceable.

Economic structure. Because the construction workforce (direct and indirect) would be only 125 people and the construction period would be 14 months, the effect of the proposed action on the economic structure of the local area would be small, but favorable. The unemployment rate in Tooele County has the potential to fall slightly in the impact area due to the hiring of current residents and the in-moving of project employees. In addition, impacts to the economic structure of the Skull Valley Band should be proportionately greater, since any construction jobs that might be filled by tribal members would constitute a positive impact on the Tribal economy, and increased sales by the Pony Express Convenience Store are likely to result. In addition to jobs for Tribal members, the applicant has indicated that training and development opportunities would be available for other Tribal members (PFS/SAR 2001). Finally, the purchase of ballast and sub-ballast from nearby commercial gravel pits would be a small but positive impact on the local economy.

5.5.1.2 New ITF Near Timpie

Construction of the ITF and its associated rail siding and access road would require an estimated peak work force of 35 workers and would be performed within one year of issuance of an NRC license for the proposed PFSF. The bulk of the manpower would be for earthwork, pouring the building foundation, erecting the gantry crane and metal building, installing building electrical and mechanical infrastructure, laying railroad track, paving the access road, and installing site fencing. The work force would include equipment operators, laborers, electricians, iron workers, concrete finishers, and construction supervision staff.

Following the same approach and using the same assumptions in the assessment of socioeconomic impacts of constructing the proposed PFSF (see Section 4.5.1), if 30 percent of the direct workforce (approximately 11 workers) moves into the area, and approximately 60 percent of those (seven workers) were accompanied by families (with a family size of 2.87), the local population would increase by 24 residents in 11 households due to direct employment; this translates into four workers unaccompanied by family, seven workers accompanied by family, and 13 family members of construction workers. The construction of the ITF would also result in approximately 18 indirect jobs, with two of those workers moving into the area during the construction period; assuming that one of these workers brings a family and that the average family size would be 2.87, an upper bound of four new residents in two households would be expected as the result of indirect employment. Combining the above direct and indirect in-moving yields a total of 28 new residents in 13 households as an upper bound. Unaccompanied workers would live in five of these households while the other eight households would consist of workers and their families. Based on the Tooele County average of 0.7 school aged children per household (Governor's Office of Planning and Budget, Economic and Demographic Projections, 1997; http://www.governor.state.ut.us/dea/ demographics/household.htm), it is expected that six additional children would be added to local schools.

Population. Impacts of construction of the ITF to populations levels in Tooele County are expected to be small. Workers who move to the impact area during construction of the ITF and associated siding would probably be distributed in communities in the eastern portion of Tooele County (e.g., Grantsville and Tooele) because they are closest to the proposed site for the ITF and have vacant housing units available for rent and sale. It is unlikely that any in-moving workers and their families would locate in Skull Valley itself since there are few, if any, housing units available; it is possible that members of the Skull Valley Band who return to their Reservation for employment during construction of the ITF might decide to live on the Reservation. The precise distribution of in-movers would be determined by a number of factors, including proximity to the proposed ITF and the availability of housing and public services. The 28 new residents used in this analysis as an upper bound would represent an increase of less than 0.1 percent to the 1996 population of Tooele County. If all of these in-migrants located in either Grantsville or Tooele, the population increase would be 0.6 percent in Grantsville or 0.2 percent in Tooele. While growth of this magnitude could be accommodated without disrupting the affected communities, it is very unlikely that all new residents would settle in a single community.

Housing. Any housing impacts from construction of the ITF are expected to be small. The 13 new households used as an upper bound in this analysis would represent approximately 3.8 percent of the vacant housing units, not counting housing units in Wendover or Dugway, that were for sale or rent in Tooele County in 1990 (the most recent year for which data are available). Even if all project-induced in-movers settled in either Grantsville or Tooele, which is highly unlikely, the number of housing units needed would not exceed the number of vacant units for sale or rent in either of these communities.

Education. The addition of six new school-age children would increase enrollment in Tooele County by only 0.07 percent. Even in the highly unlikely event that all in-movers would locate in a single community, the increases in enrollment would be very small.

Utilities. The impacts of constructing the ITF on water use and other utilities within Skull Valley are expected to be small. The addition of 13 new households and 28 new residents is not expected to strain existing utilities within the impact area, since most if not all of those in-movers would be expected to occupy currently vacant housing units already hooked up to utilities (e.g., in Rush Valley or Tooele Valley).

Solid and sanitary waste. Impacts to solid waste management are expected to be small to non-existent. Clearing of the right-of-way for the ITF parcel would involve the removal and disposal of vegetation within the right-of-way. Any woody vegetation would be shredded and scattered in place. Sanitary wastes would be managed with conventional systems, such as portable toilets.

Transportation and traffic. Impacts of the construction of the ITF on the local transportation system are expected to be small. Construction of the ITF and associated access road and rail siding would require the movement of excavated soils and ballast and sub-ballast. The amount of ballast, sub-ballast, and other rail bed construction materials needed for the rail siding amounts to approximately

12,350 m^3 (16,150 yd^3), and approximately 1,900 m^3 (2,500 yd^3) of asphalt paving would also be needed (PFS/ER 2001). The ballast and sub-ballast (composed of crushed gravel or rock) would be obtained from one or more existing commercial gravel pits in the area. Assuming a per-truck capacity of approximately 15.3 m^3 (20 yd^3) (PFS/SAR 2001) for movement of the ballast, sub-ballast, and other construction materials a total of approximately 1,615 truck trips would be required to transport all construction materials (a truck trip, or vehicle trip, is defined as a single one-directional vehicle movement; hence, a vehicle arriving and departing the point of delivery constitutes two vehicle trips). Assuming that these 1,615 trips are made within a three month period of the 12-month construction period, there would be approximately 27 truck trips per day (13 to 14 trucks going each way on I-80 to and from the point of ballast and sub-ballast delivery) or approximately three vehicles per hour.

In addition to ballast and sub-ballast deliveries, a peak construction work force of 35 workers would commute to and from the construction site in individual passenger vehicles and light trucks on a daily basis. These workers will account for an increase of 70 vehicle trips per day on Interstate 80 during construction of the ITF and associated access road and rail siding. All together, construction of the ITF and associated access road and rail siding would result in an increase of approximately 100 vehicle trips per day on Interstate 80. This increase amounts to approximately 1.2 percent greater use of the interstate than had been experienced in 1995 (see Section 3.5.2.4). This additional traffic volume would have a negligible effect on the level of service on Interstate 80 but could have some temporary adverse effects on the movement of traffic onto and off of the interstate. This adverse effect on feeders to and from Interstate 80 also results from delivery trucks moving at a slower rate of speed before entering and after leaving the interstate than other traffic, requiring other traffic to reduce travel speed. There is also the potential for increased wear and maintenance requirements on Skull Valley Road due to heavy truck traffic.

Land use. Construction of the ITF would have small impacts on current land use. The site for the ITF and associated access road and rail siding is located on previously disturbed, but currently unused public land, administered by the BLM. The site is adjacent to the Union Pacific main line.

Economic structure. Because the construction workforce (direct and indirect) would be 35 people and the construction period would be less than one year, the effect of the proposed PFSF on the economic structure of the local area would be small but favorable. The unemployment rate in Tooele County would have the potential to fall slightly in the impact area due to the hiring of current residents and the in-moving of project employees. In addition, impacts to the economic structure of the Skull Valley Band should be proportionately greater, since any construction jobs that might be filled by tribal members would constitute a positive impact on the Tribal economy. In addition to jobs for Tribal members, the applicant has indicated that training and development opportunities would be available for other Tribal members (PFS/ER 2001, p. 7.2-2). Finally, the purchase of ballast, sub-ballast, and asphalt paving from nearby firms would be a small but positive impact on the local economy.

5.5.2 Impacts During Operations

Direct impacts to socioeconomic and community resources are primarily associated with any physical changes to those resources that would result from operation of either of the two local transportation options. Indirect impacts are primarily associated with workers and families who might move into the area and place additional demands on existing resources. As discussed in the following paragraphs, both direct and indirect impacts are expected to be small.

5.5.2.1 New Rail Line from Skunk Ridge

Direct impacts of the proposed rail line for the movement of SNF from Skunk Ridge to the proposed PFSF would have small to moderate impacts to socioeconomic and community resources. This is because the change to the physical environment required for operation of the rail line impinges directly on livestock grazing resources (direct impacts to recreational resources and opportunities are addressed in Section 5.8.3). The increased risk of fire associated with use of the proposed rail line could also have a corresponding effect on the availability of livestock and wildlife forage in the event of a spark-induced fire (see Section 5.8.4). However, revegetated areas of the rail line may function as a green strip to help prevent the spread of fire (see Section 5.4.2.1). Such a fire barrier would minimize the potential impact from any spark-induced fires.

The socioeconomic and community resource impacts from operation of the rail line from Skunk Ridge to the proposed PFSF are a function of the anticipated traffic on this new line compared to the existing traffic on the main Union Pacific line. PFS plans no more than one or two round trips per week using the new rail line, and this volume of traffic is sufficiently small as not to result in any significant impacts (including impacts to grazing or recreational activities).

Indirect impacts are expected to be small, since the work force required to operate the proposed rail line, which is incorporated in the work force for operation of the proposed PFSF itself (see Section 4.5.2), is very small. Since the indirect impacts to socioeconomic and community resources associated with the PSFS workforce itself were small, they would likewise be small for operation of the proposed rail line.

5.5.2.2 New ITF Near Timpie

Direct impacts of using the ITF/heavy haul local transportation option are also expected to be small, although the use of Skull Valley Road to transport fabricated steel liners for the storage casks and 2 to 4 round trip shipments, per week, of SNF in shipping casks to the proposed project site, could result in possible delays for traffic along Skull Valley Road (see Section 4.5.2).

The socioeconomic and community resource impacts of using an ITF and transporting the SNF in canisters in heavy-haul tractor/trailers on Skull Valley Road to the proposed PFSF are a function of the amount of heavy-haul traffic on Skull Valley Road. PFS plans two to four round trips per week for the heavy haul transportation of casks along the 42-km (26-mile) segment of Skull Valley Road from the proposed ITF to the proposed PFSF (PFS/SAR 2001). The heavy haul tractor/trailers would move at a slow rate of speed [32 km/h (20 mph)], requiring other traffic to reduce travel speed or make additional passing maneuvers (PFS/SAR 2001). Utilization of heavy haul equipment for cask transportation would result in the transportation vehicle passing within approximately 15 m (50 ft) of two residences located along Skull Valley Road (PFS/SAR 2001). In addition, there is some potential for inconveniencing regular traffic along Skull Valley Road as a result of these movements, but the small number of round trips per week should result in no significant impacts.

Indirect impacts are also expected to be small, since the workforce required to operate the ITF, with the exception of the heavy haul truck drivers, are part of the work force for operation of the proposed PFSF itself (see Section 4.5.2). Since the indirect impacts to socioeconomic and community resources associated with the PFSF workforce itself have been determined to be small (see Section 4.5.2), they would likewise be small for operation of the ITF and heavy haul transportation option.

5.5.3 Impacts at the Alternative Site B

The alternative location (i.e., Site B) in Skull Valley for the proposed PFSF lies just south of the preferred site. Because Site B is very close to the preferred site, there would be no discernible differences in the anticipated impacts to socioeconomic and community resources during construction or operation for either of the local transportation options.

5.5.4 Mitigation Measures

Since the direct and indirect impacts of construction and operations for both local transportation options to socioeconomic and community resources are considered small to moderate, few mitigation measures are required.

The only socioeconomic and community resources that are potentially adversely affected by construction and operation of the proposed transportation facilities are (1) livestock, in that there could be disruptions to livestock management, including livestock movement across the tracks both within and between pastures for the new rail line option and (2) transportation, in that there could be increased traffic along Interstate 80 and Skull Valley Roads during construction, as well as for the ITF/heavy-haul option. Mitigations for these impacts are discussed in the following paragraphs.

The potential for impacts to livestock management arises due to conflicts between existing use of the land and its water resources and the construction and use of the proposed rail line. Any adverse impacts to grazing could be avoided or ameliorated by taking several actions, including the repair and maintenance of Pasture and Allotment division fences crossed by the proposed rail line in such a manner that livestock would not be able to cross from one area to the other (e.g., cattle guards); cooperating with the BLM and permitees to develop watering facilities east of the proposed rail route for the purposes of providing watering facilities for livestock and for use for fire suppression; providing livestock-secure fenceline crossings; and developing fire mitigation and detection plans in cooperation with BLM. The Cooperating Agencies propose that PFS be required to develop a plan to minimize impacts to livestock grazing activities during construction and operation (see Section 9.4.2).

The potential for traffic impacts arises due to the anticipated increase in the use of Skull Valley Road by construction and operation workers, as well as the possible use of heavy-haul vehicles under the ITF transportation option. The potential for adverse impacts to traffic during operations on Skull Valley Road would be greatest during the movement of fabricated steel liners and SNF to the proposed PFSF. The magnitude of such impacts are discussed above. Consideration should be given to the avoidance or amelioration of adverse transportation impacts by appropriate scheduling of facility-related traffic.

Degradation of the unimproved roads adjacent to the proposed rail line corridor could occur if these roads are used frequently by PFS or used to transport heavy materials. Therefore, the Cooperating Agencies propose that PFS be required to contact BLM prior to any use of the unimproved roads that could lead to their degradation (see Section 9.4.2). In addition, PFS could minimize the impacts to these roads by a number of actions, including covering them with gravel, occasionally blading the roads, or using a coating such as magnesium-chloride. Therefore, the Cooperating Agencies propose that PFS be required to develop a plan to minimize impacts to the unimproved roads, if PFS determines that continual use of such roads is necessary to transport either workers or materials (see Section 9.4.2).

5.6 Cultural Resources

5.6.1 Construction Impacts

5.6.1.1 New Rail Line from Skunk Ridge

As discussed below, impacts are expected to be small to moderate. Under the proposed action, development of the proposed Skunk Ridge transportation route would involve construction of a new rail siding at Skunk Ridge and construction of a rail line southward through the western portion of Skull Valley to Site A on the Reservation. An intensive field cultural resources survey of the proposed rail alignment has documented the presence of 12 historic period properties within the corridor (Birnie and Newsome 2000). Of the 12 sites, 8 are considered eligible for inclusion in the *National Register,* including the Hastings Cutoff (site 42TO709, which is part of the California National Historic Trail), U.S. Route 40 (site 42TO1409), the "new" Victory Highway (site 42TO1410), an old alignment of the Victory Highway (site 42TO1411), a late nineteenth- and early twentieth-century telegraph line (site 42TO1412), the Western Pacific Railroad (site 42TO1413), a segment of the Deep Creek Road, which may contain portions of the Beckwith Trail (site 42TO1416); and the Sulphur Spring or Eight-Mile Spring Road (site 42TO1417); which is part of the California National Historic Trail. Three of the remaining sites were evaluated as not possessing qualities that would make them eligible for inclusion on the *National Register*. These included a buried AT&T telephone line, remains of a gas station on the "New" Victory Highway, and a gas station location on U.S. 40. In each case, substantial deterioration in resource content and integrity resulted in the "not eligible" determination. Another site, a rock alignment and cairn (site 42TO1187), was also determined to be "not eligible" for listing on the *National Register* (see Section 1.5.5 and Appendix B).

Because of its high degree of physical integrity and association with significant historical events and people, the fairly well preserved segment of the historic emigrant trail known as the "Hastings Cutoff" (of the California National Historic Trail) (42TO709) is considered to be eligible for listing on the *National Register*. Because the proposed transportation corridor crosses the Hastings Cutoff segment at essentially a right angle, construction of the railroad would directly impact only a short segment of the trail. In addition to the physical integrity of the trail in this area, the Skull Valley setting is one without extensive development of modern intrusions. Therefore, the general environmental setting retains a visual impression of the original landscape during the westward migration of the mid-1800s. As a consequence, construction of the Skunk Ridge rail line will be an intrusion on both the cultural landscape aspect and physical vestiges of this historic episode.

The Cooperating Federal Agencies have concurred with the eligibility determination for the 8 sites for inclusion in the *National Register* and the four sites not eligible for inclusion (see Section 1.5.5 and Appendix B). In addition, the Cooperating Federal Agencies have determined that the proposed project would have adverse effects on some of these properties. The potential impacts along this corridor are expected to be moderate but could be mitigated prior to construction (see Section 5.6.5).

5.6.1.2 New ITF Near Timpie

As discussed below, impacts of the ITF are expected to be small. Use of the existing Skull Valley Road for heavy-haul transportation would involve construction of a new ITF near Timpie and use of the existing Skull Valley Road. Historic features present in the vicinity of the proposed ITF include a historic telephone line and the historic Union Pacific Railroad with associated features. An archeological survey of this location revealed no archeological resources within the location itself (Birnie and Newsome 2000). Therefore, the potential for impacts to cultural resources at the ITF location is considered to be small.

As discussed in Section 3.6, there are several known prehistoric and historic properties in the vicinity, including the historic Timpie Railroad Siding, active and abandoned historic ranches, the former Iosepa town site, historic trails and the early Lincoln Highway route, and several recorded archaeological sites. The eastern side of the valley also includes known, but unrecorded, historic period tribal winter village sites, and many other important named places on the landscape. However, use of the Skull Valley Road with no improvements would not impact known cultural resources along that corridor. Therefore, the heavy-haul alternative from Timpie to the preferred site on the Reservation would have a small potential for impacts to cultural resources.

5.6.2 Impacts During Operations

Normal operational activities to transport SNF to the PFSF on the Reservation are not expected to have potential for impacts to cultural resources since no additional ground disturbance will occur. Therefore, the overall potential for impacts is expected to be small.

5.6.3 Impacts at the Alternative Site B

The potential for transportation related impacts to cultural resources should the proposed PFSF be constructed at Alternative Site B on the Reservation are essentially the same as for Site A, and are expected to be small to moderate. Impacts from the ITF are expected to be small.

5.6.4 Native American Cultural Resources

Based on the Section 106 consultation process with regional Federal Recognized Indian Tribes and other organizations (see Section 1.5.5) and comments received during public scoping meetings, there are no identified traditional cultural properties or other traditional cultural resources known to exist along the Skunk Ridge rail corridor or at the ITF location. The former Native Hawaiian townsite of Iosepa and the currently protected associated cemetery lie adjacent to the Skull Valley Road, but would not be affected by construction or heavy haul traffic since the road itself would not be altered. Based on the known information regarding the presence of traditional cultural places along the transportation features, the potential impacts to such resources are considered to be small.

5.6.5 Mitigation Measures

As part of the consultation process required by Section 106 of the NHPA, a draft Agreement has been prepared that outlines agreed-upon measures that PFS will take to avoid, minimize, or mitigate these adverse effects (see Appendix B and Section 1.5.5). The Agreement contains a commitment to develop a Treatment Plan that includes specific mitigation measures for cultural resources within the proposed area. These mitigation measures include documentation, avoidance as much as possible during construction by barricading and development of education material (see Section 1.5.5 and Appendix B). Because the potential to find buried cultural resources also exists, the Agreement also specifies that a Discovery Plan for previously unencountered sites will be appended to the Treatment Plan. A final Treatment Plan will be completed prior to any construction of the proposed rail line.

In view of the above, the Cooperating Agencies propose that PFS be required to implement all mitigation measures set forth in the Memorandum of Agreement developed as part of the consultation process under Section 106 of the NHPA (see Section 9.4.2). In addition, the Cooperating Agencies propose that, if PFS identifies any previously unrecorded artifacts or other cultural resources during construction activities on land under the jurisdiction of BLM, PFS be required to immediately cease construction, inform BLM of the identified resources, and arrange for evaluation of the resources by a qualified individual (see Section 9.4.2).

5.7 Human Health Impacts of SNF Transportation

This section discusses the radiological and non-radiological human health impacts associated with transportation of SNF from nuclear power plants to the proposed PFSF in Skull Valley. For cross-country transportation to the proposed PFSF, only shipments by rail are analyzed because PFS plans to receive only rail casks under its NRC license. However, also considered are rail shipments that might involve a short highway (or barge) segment to reach a rail line, for reactor sites that do not have direct rail access, or if an ITF is constructed in Skull Valley. This FEIS also documents an evaluation of impacts of transporting SNF from the PFSF to the western border of Utah, on its way to a permanent repository in the western United States. A DEIS prepared by DOE (DOE 1999) addresses in detail the national and regional transportation impacts of building and operating a proposed permanent repository at Yucca Mountain, Nevada. The NRC staff performed an additional assessment of shipment of SNF from the proposed PFSF to a permanent repository. Congress, in the Nuclear Waste Policy Act, as amended (NWPA), has directed the DOE to study one candidate repository, namely, a repository proposed at Yucca Mountain, Nevada. To reflect the provisions of the NWPA, the NRC staff has examined the shipment of SNF via rail from the proposed PFSF, on its way to a permanent repository in the western United States, as if such a repository were located at Yucca Mountain, Nevada, although that location may or may not become the actual repository. Accordingly, the NRC staff examined the shipment of SNF via rail from the proposed PFSF through Black Rock, Utah, to the Utah-Nevada border. It should be noted that the NRC has not received an application requesting a license for a permanent geologic repository, and the NRC has not made any determination regarding any proposal to construct such a repository at Yucca Mountain, Nevada, or any other location.

The non-radiological human health impacts discussed in this section include (1) the occupational hazards from construction and operation of the proposed rail line and an ITF; (2) the safety impacts associated with increased rail traffic, which include an analysis of the increase in traffic accidents (e.g., derailments, crossing accidents) attributable to the additional rail traffic; and (3) human health effects due to vehicle exhaust emissions along the rail lines during transport of SNF to the proposed PFSF. The potential non-radiological impacts would also include socioeconomic impacts (see Section 5.5) and environmental justice impacts (see Section 6.2).

5.7.1 Non-Radiological Impacts

5.7.1.1 Potential Worker Injuries During Construction and Operation of Transportation Facilities

Potential health impacts to workers during construction and operation of transportation facilities in Skull Valley would be limited to the normal hazards associated with the construction and operational activities of these facilities (i.e., no unusual situations would be anticipated that would make the proposed construction activities more hazardous than normal for a major industrial construction project). The impacts of these hazards include fatal and nonfatal occupational injuries that may result from overexertion, falls, or being struck by equipment (NSC 2000). Because there are no unusual situations anticipated to make the construction-related activities more hazardous than normal, there would be only small impacts to worker health and safety due to occupational construction-related activities. As discussed below, the non-radiological health effects are judged to be small.

During the construction and operation of either the proposed rail line or the ITF, non-radiological pollutants of concern to worker and public health would include the criteria pollutants and dust (both of which are addressed in Section 5.3). With adequate control measures, such as treating areas with water or chemical surfactants for dust suppression, etc., the impact on worker and public health would be expected to be small. There are no other potential non-radiological health impacts to the public from the proposed project, since members of the general public would not be allowed on the construction sites. Therefore, only fatal and nonfatal occupational injuries warrant any further analysis. These types of injuries are discussed below.

In order to estimate the number of potential fatal and nonfatal occupational injuries due to the construction, normal operations, and decommissioning of transportation facilities in Skull Valley, data on fatal occupational injuries per 100,000 workers per year and data on nonfatal occupational injuries with days of work lost per 100 full-time workers per year were identified in "Injury Facts" (NSC 2000). The data tables reflect input from both BLS and OSHA. These BLS and OSHA data for the construction, trucking and railroad industries were used to estimate the potential fatal and nonfatal occupational injuries for the construction and normal operations of the proposed transportation facilities in Skull Valley. Table 5.4 presents the number of fatal and nonfatal occupational injuries during the construction and normal operations of both the proposed rail line and the ITF.

Table 5.4. Estimated numbers of fatal and nonfatal occupational injuries for the construction and normal operations for the proposed rail line and the ITF

Activity	Duration of activity	Predicted number of fatal injuries	Predicted number of nonfatal injuries
Construction			
Rail line	14 months	0.020	4.8
ITF	1 year	0.0051	1.2
Operations			
Rail line	40 years[a]	0.009	1.7
ITF	40 years[a]	0.017	5.1

[a]40 years includes 20 years of operations under the requested NRC license and 20 years of operations under a renewed license, if any.

Source: National Safety Council (2000). "Injury Facts," 2000 edition, Itasca, Il.

Potential worker injuries during construction. The transportation facilities would be subject to OSHA'S General Industry Standards (29 CFR Part 1910) and Construction Industry Standards (29 CFR Part 1926). Construction risks can be minimized by adherence to the procedures and policies required by OSHA and the state of Utah. These standards establish practices, procedures, exposure limits, and equipment specifications to preserve employee health and safety. In addition OSHA inspections can also be employed in an effort to reduce the frequency of accidents and further ensure worker safety.

***Potential fatalities*.** The construction of the proposed rail line would require a peak work force of 125 workers and would be completed in 14 months. Based on data presented in NSC (2000) for construction worker fatal occupational injuries (i.e., fatalities), the number of fatalities over the construction period is estimated to be 0.02(i.e., less than one). This estimate is conservative, because it assumes that a work force of 125 workers (the estimated peak workforce) would be employed for the entire construction period.

The construction of the ITF would require a peak workforce of 35 workers and would be completed in less than one year. The number of fatalities during the construction of the ITF was estimated to be 0.005 (i.e., less than one). This estimate is also conservative, because it assumes a force of 35 workers (the estimated peak workforce) would be employed for the entire construction period.

Potential nonfatal occupational injuries. Based on BLS statistics for construction worker nonfatal occupational injuries, the number of nonfatal injuries (that include lost workdays) over the 14-month construction period of the rail line is estimated to be 4.8. Based on BLS statistics for construction worker nonfatal occupational injuries, the number of nonfatal injuries (that include lost workdays) over the 1-year construction period for the ITF is estimated to be 1.2.

Potential worker injuries during operations. Following the construction of either of the two transportation facilities, SNF would be transported from the northern portions of Skull Valley to the proposed PFSF. Worker injuries may occur during these local transportation activities.

***Potential fatalities*.** Operation of the proposed rail line would involve two employees operating a locomotive to move SNF to the proposed PFSF. These activities would occur over a 40-year period, including the receiving of SNF shipments and the shipment of SNF away from Skull Valley to a permanent repository. Based on BLS statistics of the railroad transportation industry, the number of fatalities during normal operations over 40-years is estimated to be 0.009 (i.e., less than one).

Operation of the ITF would require a four-man crew to move SNF on Skull Valley Road. These activities would also occur over a 40-year period. Based on BLS statistics for the trucking and warehousing industry, the number of fatalities during normal operations over 40-years is estimated to be 0.017 (i.e., less than one).

***Potential nonfatal occupational injuries*.** An analysis of the railroad transportation industry's statistics indicates that approximately 1.7 nonfatal injuries that involve lost workdays would occur on the proposed rail line during normal operations over 40 years.

For operation of the ITF and the heavy-haul vehicles down Skull Valley Road, approximately 5.1 nonfatal injuries would involve lost workdays during normal operations over 40-years. This includes the risks of activities involving the transfer of SNF casks from railcar to truck at the ITF, as well as transportation of SNF by heavy-haul vehicles on Skull Valley Road.

5.7.1.2 Rail Traffic Accidents

The proposed PFSF will have the capacity to store 4,000 casks. PFS has indicated that on average there would be 50 incoming shipments per year carrying four spent fuel casks each. On the basis of this information, the shipping campaign would last 20 years. The casks would eventually be shipped to a national repository for final disposal. Based on the Waste Confidence Rule in 10 CFR 51.23, a permanent repository will be available within the first quarter of the twenty-first century. If the proposed PFSF operates as described by the applicant, SNF would be shipped directly from the PFSF to a permanent repository. For purposes of this analysis, it is assumed that the PFSF could be emptied in 10 years by placing four casks on each train and making 100 shipments per year. Assuming 10 years of on-site storage with no incoming or outgoing SNF shipments, it can be inferred that the PFSF would then be operational for a total of 40 years (20 years under an initial license, and 20 years under a renewed license). As indicated above, operation of the proposed PFSF for 40 years is bounding with respect to effects on human health.

The NRC staff determined that the average distance by rail to the proposed PFSF from nuclear power reactors east of the proposed site in Skull Valley is 3,410 km (2,119 miles); the distance is less for nuclear power reactors west of the proposed PFSF. If each SNF train travels an average of 3,410 km (2,119 miles), the total distance covered by the trains for the entire campaign for shipping 4,000 SNF canisters (at one per railcar) to the facility will equal 13.6×10^6 railcar-km (8.5×10^6 railcar-miles). For trains eventually transferring casks away from the proposed PFSF to the proposed (or similar) permanent repository, the rail distance is estimated to be 950 km (590 miles). Thus, the total distance covered by trains in transferring all casks to the national repository would be 3.8×10^6 railcar-km (2.4×10^6 railcar-miles). Therefore, the total distance associated with the entire lifetime set of operations (i.e., both receiving SNF at and shipping SNF from the proposed PFSF) would be 17.4×10^6 railcar-km (10.8×10^6 railcar-miles). A round-trip calculation is included in this analysis to provide an upper bound on the number of railcar-km. The round-trip distances for the lifetime set of operations would then be 34.8×10^6 railcar-km (21.6×10^6 railcar-miles).

Vehicle-related accident risks involve accidents that result in injuries and fatalities that are not related to the cargo being shipped. Saricks and Kvitek (1994) examined these risks and found— based on national average accident statistics—that, considering all injuries and fatalities associated with regular trains, the rates were 4.26×10^{-8} injuries per railcar-km and 2.27×10^{-8} fatalities per railcar-km. Thus, the risk to the public from the shipping campaigns needed to get SNF to Skull Valley and then move it to a proposed national repository would be:

$$(4.26 \times 10^{-8} \text{ injuries/railcar-km}) \bullet (34.8 \times 10^{6} \text{ railcar-km}) = 1.48 \text{ injuries, and}$$
$$(2.27 \times 10^{-8} \text{ fatalities/railcar-km}) \bullet (34.8 \times 10^{6} \text{ railcar-km}) = 0.78 \text{ fatalities}$$

over the 40 year assumed lifetime of the proposed PFSF. Because these are very small risks over the assumed 40-year life of the proposed facility, the staff finds these potential impacts to be small.

Saricks and Kvitek (1994) also noted that dedicated trains—such as would be used to transport spent nuclear fuel—spend much less time in rail yards than do regular trains, since dedicated trains do not undergo classification; thus, it appears that the injuries and fatalities based on national averages are not as relevant for dedicated trains as they are for regular trains. Should the large portion of casualties which occur in rail yards be excluded from the national averages, the injury rate would decrease by a factor of almost 7 and the fatalities would decrease by a factor of about 36.

5.7.1.3 Latent Health Effects

The cross-country shipment of SNF could involve non-radiological health risks associated with the generation of air pollutants by the vehicles during shipment, independent of the nature of the type of cargo being shipped. The health endpoint assessed under routine transport conditions is the risk of excess (additional) latent mortality caused by inhalation of vehicular exhaust emissions. The risk factor for latent mortality from pollutant inhalation, as generated by Rao et al. (1982), is 1.3×10^{-7} latent fatalities per train-km for rail transport in urban areas. This risk factor is based on regression analyses of the effect of sulfur dioxide and particulate releases from diesel exhaust on mortality. Vehicle-related risks from routine transportation are calculated for each case by multiplying the total distance traveled in urban areas by the appropriate risk factor. Similar risk factors are not available for rural and suburban areas.

If it is conservatively assumed that the total population along the rail routes is “urban,” then the total indirect risk to the public from the non-radiological impacts of SNF transportation can be computed as:

$$(1.3 \times 10^{-7} \text{ latent fatalities/train-km}) \bullet (34.8 \times 10^{6} \text{ railcar-km}) \div (4 \text{ railcars per train}) = 1.14 \text{ latent fatalities.}$$

Because this is a very small risk over the assumed 40-year lifetime of the proposed facility, the staff finds this impact to be small.

5.7.2 Radiological Impacts

The radiological dose impacts for both the cross-county and regional transportation of SNF to and from the PFSF are discussed in this section. In addition, the economic impacts of cleaning up a postulated release of activity from a cask are examined.

To assess nationwide impacts, a representative route approach is used. In this approach, the NRC staff analyzed transportation of SNF to the proposed PFSF as if all the spent fuel to be stored there originated from one location—the Maine Yankee nuclear power plant (even though the Maine Yankee plant itself would never have that much spent fuel to ship). This route is one of the longest possible routes that any individual shipment could experience, and also passes through some of the most populated regions of the country. Maximizing these factors tends to conservatively overestimate the transportation risks. Thus, the overall risks estimated using this route are expected to adequately characterize risks of shipments to and from the PFSF, regardless of their individual origins, transportation details (such as use of intermodal transfer), and reasonably foreseeable route characteristics. To provide additional information regarding the potential environmental impacts of intermodal operations near reactor sites (e.g., heavy haul truck to a rail head and truck-to-railcar cask transfer), illustrative examples of such operations are also assessed.

This section also presents impacts in and near Utah, and it presents the incident-free and accident dose risk estimates assuming the SNF is shipped via the alternative of an ITF near Timpie. For this alternative, SNF would first be transported by rail to the siding at Timpie (i.e., the ITF) and then by heavy-haul vehicle southward on Skull Valley Road to the PFSF.

In the past, the NRC has performed a number of generic studies on the transportation of radioactive materials (including SNF) that can be compared with the findings in this FEIS. Notable among these studies are the 1972 WASH-1238 study and the 1977 NUREG-0170 study, as described below.

LATENT CANCER FATALITIES

One measure of risk used in this section is the latent cancer fatality (LCF**).** A latent cancer fatality is a death from cancer resulting from, and occurring an appreciable time after, exposure to ionizing radiation. The probability of developing a fatal cancer from exposure to 1 rem of ionizing radiation is estimated to be 0.0005 (5 chances in 10,000). The coefficients or factors used for health effects in this FEIS for the public and occupational radiation risk are 5×10^{-4} and 4×10^{-4} health effects/rem, respectively. These coefficients are based on data obtained at much higher doses and dose rates than those encountered by the general public or workers. A linear extrapolation from the lowest doses at which effects are observable down to the occupational range was used to generate these coefficients. The assumption of a linear extrapolation has considerable uncertainty, but is believed to present a conservative estimate of the risk.

In a population of 10,000 people, national statistics indicate that about 2,224 people would die from cancer of one form or another. Using information developed by the International Commission on Radiological Protection, if all 10,000 people received a dose of 200 millirem (in addition to the normal background radiation dose), 1 additional cancer fatality would be estimated to occur in that population. However, we would not be able to tell which of the 2,225 fatal cancers was caused by radiation, and the additional radiation might possibly cause no fatal cancers.

Sometimes, calculations of the number of latent cancer fatalities associated with radiation exposure do not yield whole numbers, and may in fact yield numbers less than 1.0. For example, if each individual in a population of 100,000 received a total dose of 0.001 rem, the collective dose would be 100 person-rem and the corresponding estimated number of latent cancer fatalities would be 0.05 (that is 100,000 persons × 0.001 rem × 0.0005 latent cancer fatality per person-rem). Because this numerical result is less than 1 fatality, further interpretation (as discussed below) is required. The result must be interpreted as a statistical estimate. That is, 0.05 is the *average* number of deaths that would result if the same exposure situation were applied to many different groups of 100,000 people. For most groups, no single individual would incur a latent cancer fatality from the 0.001 rem dose each person would have received. In a small fraction of the groups, 1 latent fatal cancer would result; in exceptionally few groups, 2 or more latent fatal cancers would occur. The *average* number of deaths over all of the groups would be 0.05 latent fatal cancer (just as the average of 0, 0, 0, and 1 is 1/4 or 0.25). For the scenario under discussion, the most likely outcome for any single group of exposed persons is 0 latent cancer fatalities.

Overall, these earlier studies concluded that the incident free impacts from transportation are small, and that the risks from accidents are lower than the incident free impacts. WASH-1238, "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants," (December 1972), and Supplement 1 thereto, NUREG-75/038 (April 1975), led to codification of the NRC's conclusions regarding the environmental impacts of shipping fuel to and waste from a reactor. These impacts are codified in Table S-4 in 10 CFR Part 51. The conclusions set forth in Table S-4 may be used in environmental impact statements for licensing nuclear power reactors in lieu of a specific assessment of transportation impacts, provided that a specific set of conditions is satisfied. These conditions are set forth in 10 CFR 51.52(a). The NRC reviewed 10 CFR 51.52(a) and determined that PFS did not satisfy all of the conditions; therefore, the NRC staff has performed a more detailed assessment of the proposed PFS transportation activities. The NRC staff has compared the results of this assessment with the results from NUREG-0170, "Transportation of Radioactive Material by Air and Other Modes," (December 1977), a previous generic assessment that explicitly considered the impacts of shipping SNF from multiple reactor sites. The sections that follow present these results, as do Appendices C and D (but in greater detail). For context, a brief comparison of this FEIS, NUREG-0170, and Table S-4 is provided in Section 5.7.2.3. In short, the assessment demonstrates that the impacts associated with the transportation activities connected with the proposed action fall within the impacts stated in either Table S-4 or NUREG-0170, and characterized as small in them.

5.7.2.1 Summary of Findings

This section summarizes the results of the cross-country transportation analyses performed for this FEIS. Details of the analyses that were performed are presented in later sections. Results are presented and compared to those of NUREG-0170. NUREG-0170 is used by NRC and the DOT as a basis to determine the adequacy of the regulations (10 CFR Part 71 and various parts of 49 CFR) governing radioactive materials transportation. The annual radiological impacts of transportation calculated in this study and NUREG-0170 are summarized in Tables 5.5, 5.6, and 5.7. It should be noted that comparing the LCF predictions from NUREG-0170 and those obtained through this analysis are not straightforward because different models were used to estimate the values. However, the results from both studies show that the estimated LCFs associated with the transport of SNF would be small.

Table 5.5. Annual incident-free SNF transportation doses[a]

		Incident-free dose [person-Sv (person-rem)]	
	Number of shipments per year	Rail	ITF
Reactor site to proposed PFSF	200	0.104 (10.4)	0.23 (23)
Proposed PFSF to a final repository[b]	200	0.00298 (0.298)	0.069 (6.9)
NUREG-0170	652	2.98 (298)	—

[a]Includes doses to the public, transportation workers, and workers handling fuel at the ITF.
[b]Evaluates transportation impacts from the proposed PFSF to the Utah-Nevada border.

Comparing Tables 5.6 and 5.7, the estimates of incident free risk exceed the estimate of accident risk for the PFSF shipments, using RADTRAN4, and measuring risk using population dose and LCFs. The population dose, which is directly proportional to the LCF, is determined by summing the doses to each person in the exposed population [for example, a dose of 0.01 Sv (1 rem) to 10 people or a dose 0.02 Sv (2 rem) to 5 people are both 0.1 person-Sv (10 person-rem)]. During incident-free transport, a larger number of people are exposed to a small radiation dose as each cask moves by; however, the accident dose risk involves estimating the probability of a severe accident itself, and then potentially a much larger exposure but to a much smaller number of people.

Based upon the discussion set forth in this FEIS, the NRC staff concludes that the radiological doses from transportation of SNF, by rail only or via the ITF, from existing reactor sites to the proposed PFSF and from PFSF to a permanent repository are small. Further, the results indicate that the estimated doses resulting from shipments of SNF to the proposed PFSF on the representative route are a small fraction of the doses reported in NUREG-0170.

Table 5.6. Annual expected latent cancer fatalities (LCFs) for incident-free SNF transport

	Number of shipments per year	Incident-free risk (LCF)	
		Rail	ITF
Proposed PFSF	200	5.08×10^{-3}	1.02×10^{-2}
NUREG-0170[a]	652	3.60×10^{-2}	—

[a]Based on the estimates in NUREG-0170 that 1 percent of the LCFs from transportation of all radioactive material would occur from rail shipment of SNF.

Note (1): Includes doses to the public, transportation workers, and workers handling fuel at the ITF.
Note (2): For an explanation of the numerical LCF values, please refer to the dialogue box in Section 5.7.2.

Table 5.7. Annual expected latent cancer fatalities (LCFs) for potential accident risk to the public during SNF transport

	Number of shipments per year	Accident risk (LCF)	
		Rail	ITF
Proposed PFSF	200	2.12×10^{-3}	2.12×10^{-3}
NUREG-0170[a]	652	8.00×10^{-1}	—

[a]Based on the estimates in NUREG-0170 that 1 percent of the LCFs from transportation of all radioactive material would occur from rail shipment of SNF.

Note: For an explanation of the numerical LCF values, please refer to the dialogue box in Section 5.7.2.

5.7.2.2 Approach to Analysis

The approach of this analysis is to estimate the overall magnitude of the annual radiological doses resulting from transport of SNF to the proposed PFSF. To complete the analysis, the potential radiological impacts from incident-free transport and potential transportation accidents associated with shipping SNF to and from the proposed PFSF were estimated. Those results were then examined to determine if the impacts of the transportation to and from the proposed PFSF were consistent with the results of NUREG-0170. See Section D.2 in Appendix D. of this FEIS for a brief discussion of NUREG-0170.

In this analysis, the RADTRAN4 computer code (Neuhauser 1992) was used to model both the overall incident-free radiological exposure and the consequences of radiological releases due to severe accidents. The route and population density numbers used by RADTRAN4 were generated by the INTERLINE computer code to estimate the impacts of shipping SNF to and from the proposed PFSF. Future changes in the population density were considered in estimating the impacts from shipping

SNF to and from the proposed PFSF. Appendix C discusses the INTERLINE route analyses and Appendix D discusses the RADTRAN4 analyses. The human health risks of the radiological exposures are expressed as LCF values. (See Section 3.7 for the definition of LCF.) Radiation-dose-to-cancer-risk factors from the National Academy of Sciences (NAS 1990) [i.e., 5×10^{-2} LCF/Sv (5×10^{-4} LCF/rem) for the general public and 4×10^{-2} LCF/Sv (4×10^{-4} LCF/rem) for workers] were used to estimate the LCF values.

Many "conservative" assumptions were used in this assessment to provide reasonable assurance that the impacts of the actual activity, if it occurs, are less than those estimated.

This assessment's RADTRAN4 computations use the accident rates, event trees, and release fractions developed in NUREG/CR-4829, *Shipping Container Response to Severe Highway and Railway Accident Conditions*, February 1987 (frequently referred to as the Modal Study). The Modal Study was conducted by Lawrence Livermore National Laboratory in support of NRC's efforts to further examine the level of safety provided by its regulations with respect to accident conditions. The Modal Study also examined transport cask response to accidents by using computer modeling of generic cask responses to accident forces. In this assessment, six increasingly severe categories of accidents were assessed that encompass the twenty accident 'bins' that were analyzed in the Modal Study (see Appendix D for details). The Modal Study results indicated that SNF shipment risks were about one-third less than those previously estimated in NUREG-0170. The NRC staff concluded from the Modal Study that NUREG-0170 clearly bounded spent fuel shipment risks.

5.7.2.3 Assumptions and Analysis as Compared to NUREG-0170

Because the approach to this assessment (see Section 5.7.2.2) involves comparison of results to NUREG-0170 results, this section describes some of the assumptions and methodologies of this study and NUREG-0170. These comparisons are arranged by topical area in the following paragraphs. Additionally, information on the relationships, assumptions, and results of several transportation risk studies is presented at the end of this section.

Route and shipment parameters. Table 5.8 describes attributes of the generic routes used in NUREG-0170 and the representative route used in this FEIS. The radiological impacts for both incident-free transportation and possible transportation accidents are sensitive to these variables, particularly route length, so choosing a route that tends to maximize them is a conservative approach. The majority of the fuel (over 90 percent) would arrive at the proposed PFSF from eastern reactor sites. In order to develop an estimate of the total risk of cross-country shipments of SNF to the proposed PFSF, the NRC staff has taken a very conservative assumption that all 40,000 MTU of SNF would be shipped to the PFSF from the Maine Yankee plant, 16 km (10 miles) north of Bath, Maine. The route selected for this analysis is 4,476 km (2,781 miles) in length (see Figure 5.1) and passes through large population centers of Schenectady, New York; Buffalo, New York; Cleveland, Ohio; Toledo, Ohio; Gary, Indiana; Chicago, Illinois; Ogden, Utah; and Salt Lake City, Utah. The route is described in detail in Appendix C. Using this cross-country route in the transportation analysis results in a conservative estimate of the national transportation impacts of the proposed action. As compared to NUREG-0170, this route is much longer and over this route, a much larger number of people would be exposed to each SNF shipment than assumed in NUREG-0170.

Table 5.8. Spent fuel route data as used in this analysis and in NUREG-0170[a]

Parameter	Maine Yankee to PFSF: Rail to PFSF	Maine Yankee to PFSF: Rail to ITF[b]	NUREG-0170 rail route
Route length (km)	4,476	4,431	1,210
Urban fraction	0.043	0.044	0.05
Suburban fraction	0.23	0.24	0.05
Rural fraction	0.73	0.72	0.9
Population densities (people/km^2)			
Urban	2,552	2,552	3,861
Suburban	335	335	719
Rural	9	9	6
Population assumed exposed per shipment (number of people)			
1990 population	864,029	864,029	NA
Estimated population in 2020[c]	1,123,238	1,123,238	NA
NUREG-0170 (1985)	NA	NA	277,743
Shipments per year (single cask)			
Maine Yankee to PFSF (incident-free)	200[d]	200	NA
Maine Yankee to PFSF (accident)	50[d]	50	NA
NUREG-0170 (1 cask per shipment)	NA	NA	652

[a]To convert kilometers to miles, multiply by 0.62. To convert people per square kilometer to people per square mile, multiply by 2.59.

[b]The 42 km between the ITF and the PFSF is all rural with a density of 1.3 people per km^2.

[c]Calculated as a 30-percent increase in the 1990 population.

[d]Annual average of 50 shipments of 4 casks each. Each cask acts as an individual radiation source for incident-free analysis, and all 4 casks are assumed to have a release in the accident analysis.

PFS estimates that the PFSF would receive approximately 200 casks per year. PFS also indicated that each train would average four casks; therefore, the proposed PFSF is expected to receive an average of approximately 50 train shipments per year. For the incident-free RADTRAN4 analysis, the dose at any point as a four-cask train passes by is mathematically the same as the dose from four one-cask trains. Therefore, to simplify the incident-free analysis, RADTRAN4 was used to calculate the impact on the public assuming that all 200 casks are shipped, one cask per train; and the result was then multiplied by 200 to obtain the annual impacts. For the accident analysis it was conservatively assumed that 50 shipments of 4 casks each are made per year, and that all of the casks experience a release of the same magnitude (see Section 5.7.2.5 for additional detail).

If the proposed rail line from the Union Pacific mainline at Skunk Ridge were not constructed to the proposed PFSF, an ITF would be constructed near the Timpie siding. Heavy-haul vehicles would use Skull Valley Road to move the SNF casks from the ITF to the proposed PFSF site. The rail route from Maine Yankee to the ITF would be nearly identical to the route described for rail shipment between Maine Yankee and the proposed PFSF, except the rail route would terminate at the Timpie siding, where the SNF shipping casks would be transferred to heavy haul trucks. This rail route is 4,389 km (2,727 miles) long. The heavy-haul route from the proposed ITF near Timpie to the proposed PFSF site is 42 km (26 miles) long.

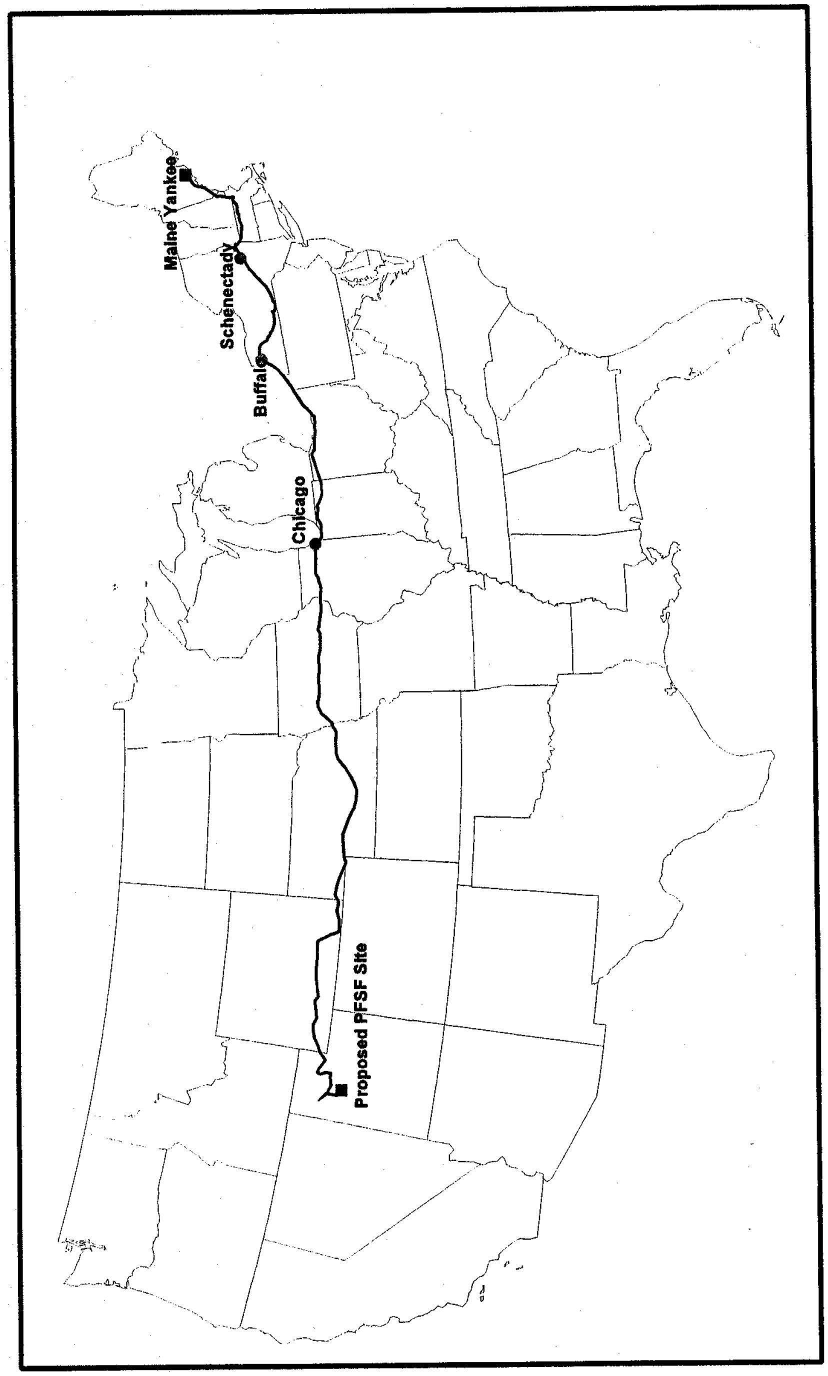


Figure 5.1. Modeled rail route from the Maine Yankee nuclear power plant to the proposed PFSF in Skull Valley, Utah.

The NRC staff performed an additional assessment of shipment of SNF from the proposed PFSF to a permanent repository. Congress, in the Nuclear Waste Policy Act (NWPA), as amended, has directed the DOE to study one candidate repository, namely a repository proposed at Yucca Mountain, Nevada. To reflect the provisions of the NWPA, the NRC staff has examined the shipment of SNF via rail from the proposed PFSF on its way to a permanent repository in the western United States as if such a repository were located at Yucca Mountain, Nevada, although that location may or may not become the actual repository. Accordingly, the NRC staff examined the shipment of SNF via rail from the proposed PFSF through Black Rock, Utah, to the Utah-Nevada border. It should be noted that the NRC has not received an application requesting a license for a permanent geologic repository, and the NRC has not made any determination regarding any proposal to construct such a repository at Yucca Mountain, Nevada, or any other location.

The route analyzed in this EIS stopped at the Utah-Nevada border (see Figure 5.2) because shipment plans beyond the border are subject to decisions of the DOE that have not yet been made (for example, the locations of intermodal transfer points or new direct-access rail lines). DOE is analyzing the national and Nevada-regional transportation impacts of building and operating a repository as proposed at Yucca Mountain (DOE DEIS 1999). Further, as discussed below, regardless of the destination location, the nationwide impacts of shipments from PFS after storage are bounded by the FEIS nationwide impacts assessment of shipments to PFS.

Population and population growth. All RADTRAN calculations were carried out using population density information from the U.S. Census Bureau for the year 1990, the latest year for which detailed census information was available when the evaluation was prepared. That information provides not only data on the number of people all over the United States, but also identifies where they live. Since that time, the U.S. population has grown, and this growth is expected to continue. Currently the U.S. Census Bureau has projected growth in the country to the year 2100, but projections are not available as to where the new people will live. To account for the population increase on cross-country routes to the proposed PFSF, the population exposures generated by RADTRAN have been multiplied by the ratio of the population projected for the year 2020 to the actual population in the year 1990. Information from the U.S. Census Bureau indicates that with an average growth rate, the population of the United States will reach 325 million in the year 2020. Since the U.S. population was 250 million in 1990, the projected increase is 325/250, or 30 percent. The number of people exposed during shipments of SNF to the proposed PFSF have been increased by 30 percent to account for population growth. Specifically, the dose and risk values that were obtained using the RADTRAN4 program were increased by 30 percent and the higher values are reported in this FEIS. Using the 1990 Census data, it is estimated that 864,029 people would live within 800 m (0.5 mile) of the rail route from Maine Yankee to the proposed PFSF. Considering the 30-percent increase, it is projected that 1,123,238 people would live within 800 m (0.5 mile) of the route from the Maine Yankee to the proposed PFSF. Both of these populations are much larger than the population (277,743 people) considered in NUREG-0170.

In 1990 the population of Utah was approximately 1.72 million. Based on U.S. Census Bureau information projected out to the year 2040, the state should reach a population of approximately 3.38 million, or approximately twice the 1990 population. Therefore, the data generated by RADTRAN4 for shipments from the PFSF to a permanent geological repository was multiplied by two to account for the increase in population at the projected time when these shipments would be made.

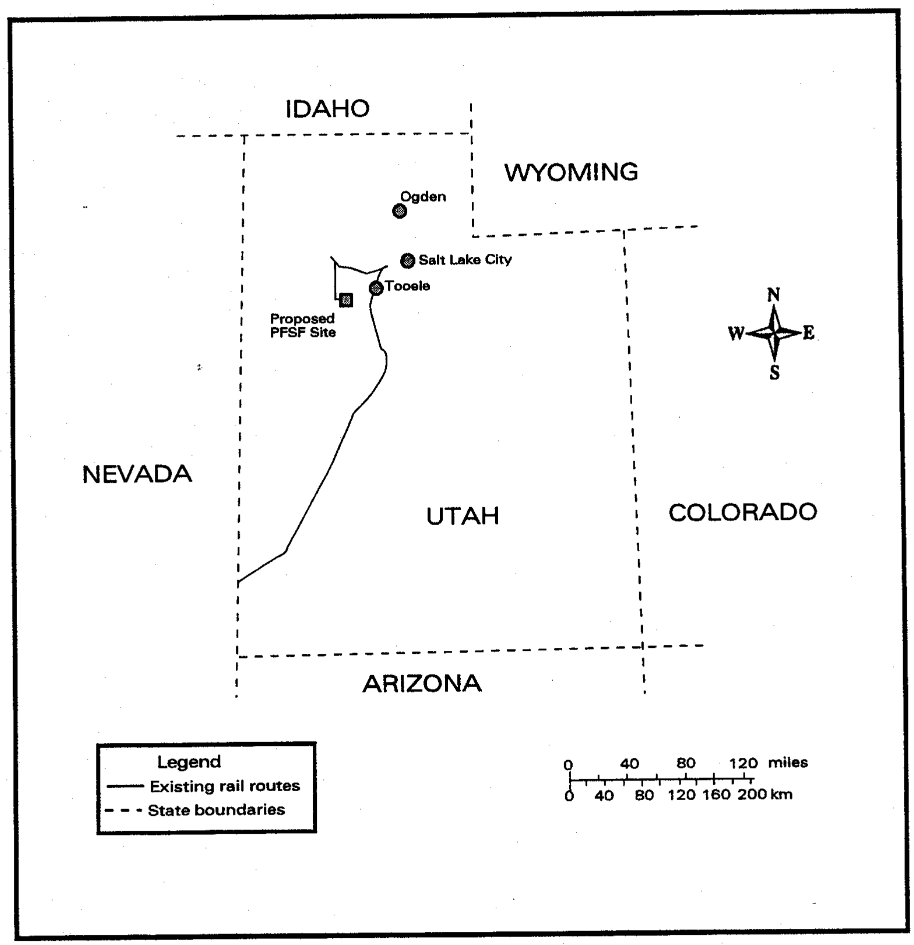


Figure 5.2. Rail route modeled for shipping SNF from Skull Valley, Utah, toward a national repository.

Package inventories and dose rates. Incident-free radiological dose was estimated by calculating a total body dose for the transport crew and the general population based on the radiation dose rate at 1 m (about 3 ft) from the shipping cask surface. The source term was conservatively assumed to consist entirely of gamma radiation for calculation of the incident-free dose. Actual cask radiation levels are measured prior to each shipment and in practice are expected to be lower than the regulatory limit. Each cask was assumed to have a dose rate of 0.13 mSv/hr at a distance of 1 m (13 mrem/hr at 3 ft) from the cask surface, which is equivalent to the regulatory limit of 0.1 mSv/hr at 2 m (10 mrem/hr at 6.5 ft.). As for accident calculations, because of the specific radionuclide content of PWR fuel assemblies and the number of assemblies inside each cask, PWR assemblies would produce a greater dose than BWR fuel assemblies in the event of an accident that breaches the cask. Accordingly, the staff performed the analysis based on PWR fuel. Each cask is assumed to contain 24 PWR fuel assemblies with a burnup of 40,000 MW-day/MTU and that have been cooled for 5 years. A representative subset of the radionuclides, which included all radionuclides that could significantly contribute to accident dose risk, was assessed. NUREG-0170 assumed that a rail cask would carry no more than 7 PWR assemblies, and that the cask dose rate was likewise 0.1 mSv/hr at 2 m (10 mrem/hr at 6.5 ft) under normal conditions.

Accident release fractions and release fraction probabilities. The risk associated with radiation exposure from releases of radioactive material in transportation accidents can be represented as the product of the probability of an accidental release and the consequences of the release (DOT 1998). Radiological consequences of accidents are calculated by assigning package release fractions for each of a set of 6 accident severity categories. The release fraction is defined as the fraction of the radioactive material in the package that could be released from that package during an accident of a certain severity. The accident severity fractions and release fractions used in this analysis are based upon the 1987 Modal Study and the methods used to apply this information are more sophisticated than the methods used in NUREG-0170. For example, NUREG-0170 did not consider cask responses to accident forces and relied upon conservative engineering judgement to estimate releases.

Comparison to previous transportation risk studies. The above paragraphs describe the NRC staff's assessment of radiological impacts for PFS transportation as compared to those impacts under NUREG-0170 and, in some cases, the Modal Study. Additional transportation risk studies have been performed that are of some interest and/or relevance. One notable study was the basis of Table S-4 in 10 CFR 51.52, which was referenced by the applicant's environmental report. In this FEIS, however, the staff has formed its conclusions primarily based upon comparisons with NUREG-0170. The NRC staff believes that NUREG-0170 is a more applicable study in this instance than the study that was the basis for Table S-4, since the PFS shipment parameters differ from those assumed in Table S-4. As informational material, however, the following paragraphs compare results of Table S-4 in 10 CFR 51.52, NUREG-0170, and this FEIS.

Each of the generic studies and this FEIS utilize different assumptions and presentation of results. For example, Table S-4 presents risk in terms of population dose per reactor-year for all modes of transportation, and this FEIS presents dose on an annual basis of 200 rail shipments. A meaningful comparison of the results of these studies, for worker and public impacts, can be expressed in terms of dose per mile traveled, as follows.

Examination of WASH-1238 (pg. 8) reveals that the Table S-4 incident-free worker result of 4 man-rem-per-reactor-year consists of at least 2.65 person-rem-per-reactor-year attributable to rail shipment (including handlers at an ITF). Further, WASH-1238 (pg. 6) gives a basis for that result of

10,000 rail-miles-per-reactor-year. (Note that the value in the WASH-1238 table is 20,000 miles, but the footnote indicates that this includes the return of empty casks to the reactor). Dividing these values (2.65/10,000) yields a worker (including ITF handlers) dose of 2.6 x 10^{-4} person-rem-per-mile.

NUREG-0170 (pg. 4-46) estimates a 1985 incident-free worker (including handler) dose of 263.6 person-rem per year. The basis for this included 652 annual rail shipments of an average of 750 miles each, for a total shipment distance of 489,000 miles-per-year. Dividing these values (263.6/489,000) yields a worker (including ITF) dose of 5.4 x 10^{-4} person-rem-per-mile.

This FEIS for a proposed facility in Skull Valley (see Table 5-10) estimates an incident-free worker dose of 13.7 person-rem per year (which includes 11.9 person-rem for the ITF workers). This is based on 555,000 miles per year (200 casks per year times Maine Yankee to PFSF distance of 2775 miles). Dividing these values (13.1/555,000) yields a worker (including ITF) dose of 2.4 x 10^{-5} person-rem-per-mile.

Repeating the above calculation, but to obtain the incident-free public dose per mile, the results are: (1) Table S-4/WASH-1238, 0.3/10,000 = 3 x 10^{-5} person-rem-per-mile; (2) NUREG-0170, 34.4/489,000 = 6.8 x 10^{-4} person-rem-per-mile; and (3) PFS EIS, 9.41/555,000 = 1.7 x 10^{-5} person-rem-per-mile.

As for accident risks, Table S-4 notes the risk from transportation accidents is “small” on a per-reactor-year basis. As shown in Table 5.7 of this FEIS, NUREG-0170 estimates a 1985 accident risk of 0.8 LCF per year, and the PFSF-specific RADTRAN4 analysis estimates an accident risk of 0.0025 LCF per year.

In March 2000, an NRC contractor report, NUREG/CR-6672, *Reexamination of Spent Fuel Shipment Risk Estimates*, was published. This report reexamined the risk associated with the transport of SNF. Cask and SNF response to collision impacts and fire were evaluated by performing three-dimensional, finite element (structural) and one-dimensional, heat transport calculations. Accident release fractions and accident severity fractions were developed to calculate the radiological risk (accident dose) from accidents. The accident dose risk was compared to dose risk calculated using NUREG-0170 and the Modal Study accident source terms. The reexamination demonstrates that both studies made a number of very conservative assumptions about SNF and cask response to accident conditions.

Based on the above information, the NRC staff concludes, for worker and public doses, that the transportation accident risk results for the proposed PFSF are a fraction of the results obtained from either NUREG-0170 or Table S-4/WASH-1238. In any event, however, even using the NUREG-0170 results, the transportation accident risks for radiological workers and the public are small. This supports the conclusion in FEIS Section 5.7.2.1.

5.7.2.4 Shipments to PFS: Nationwide Incident-Free Impacts

Because a small amount of radiation is emitted through the cask walls during incident free transportation, members of the public and transport workers along the route would receive a radiation dose from SNF shipments to the PFSF. This section quantifies these expected impacts.

Incident free assumptions. In determining incident-free impacts, the dose from each cask is assumed by the FEIS to be at the maximum value allowed by NRC regulations (note that these values are the maximum allowed for transportation packages in general, apply to millions of shipments per year, and are not specific to spent fuel casks). Specifically, each cask was conservatively assumed to have a dose rate of 0.13 mSv/hr at a distance of 1 m (13 mrem/hr at 3 ft) from the cask surface, which is equivalent to the regulatory limit of 0.1 mSv/hr at 2 m (10 mrem/hr at 6.5 ft). Further, for calculation of the incident-free dose, the source term was conservatively assumed to consist entirely of gamma radiation.

A representative route approach was used such that the NRC staff performed the analysis as if all 4000 casks of spent fuel to be stored at the proposed PFSF originated at the Maine Yankee nuclear power plant (even though the Maine Yankee plant itself would never have that much spent fuel to ship). This route is one of the longest possible routes that any individual shipment could experience, and also passes through some of the most populated regions of the country. Maximizing these factors tends to conservatively overestimate the transportation risks. Thus, the overall risks estimated using this route are expected to characterize risks of shipments to PFS, regardless of their individual origins, transportation details (such as use of intermodal transfer), and reasonably foreseeable route characteristics. Use of the representative route approach is further supported because the modes (viz., exclusively rail or intermodal including rail), routes, and companies that would ship spent fuel to PFS are subject to decisions that are yet to be made.

Incident-free results. Incident free doses were calculated for the general public, the train crew, and the Maximally Exposed Individual (MEI). The MEI was defined as an unshielded individual hypothetically positioned 30 m (98 ft) from the highway or railroad track with no intervening (shielding) objects, and the conveyance transporting the radioactive material considered in the analysis was modeled as passing by the MEI at a relatively slow speed of 24 km/hr (15 mph). This MEI was assumed to be present at this unshielded location for the entire inventory of shipments to the PFSF (200 shipments per year for 20 years). In contrast to the MEI doses (which represent the doses to a single hypothetical individual) that are presented and discussed in this FEIS, the doses to the general public include the combined doses to all members of the hypothetically exposed population and are therefore described in terms of person-Sv (person-rem).

Table 5.9 presents the doses for a one-year period and over the 20 year shipping campaign to transfer 4,000 SNF canisters to the proposed PFSF. Based on the analysis in this FEIS, the general public (approximately 1 million people) within 800 m (0.5 mile) of the rail route from a reactor site to the proposed PFSF would receive approximately 0.0918 person-Sv (9.18 person-rem) annually from the transport of 200 SNF casks to the PFSF. This would result in a public dose of 1.84 person-Sv (184 person-rem) over the 20-year campaign. The transportation crew (two people per shipment) would receive a dose of 0.0122 person-Sv (1.22 person-rem) annually, and 0.244 person-Sv (24.4 person-rem) over the 20-year campaign. (The transportation crews are not radiation workers, and their doses are governed by 49 CFR Part 173.) The MEI along this route would receive a dose of 1.1×10^{-6} Sv (1.1×10^{-4} rem or 0.11 mrem) annually, and 2.2×10^{-5} Sv (2.2×10^{-3} rem or 2.2 mrem) over the 20-year campaign.

Table 5.9. Incident free dose for SNF shipment from Maine Yankee to the proposed PFSF via rail

Dose [person-Sv (person-rem)]			Incident-free Risk (LCF)	
Transportation crew	**Public**	**RADTRAN MEI Dose [Sv (rem)]**	**Transportation crew**	**Public**
		Annual—200 casks per year		
0.0122 (1.22)	0.0918 (9.18)	1.10×10^{-6} (1.10×10^{-4})	0.000488	0.00459
		20-year campaign—4,000 casks		
0.244 (24.4)	1.84 (184)	2.2×10^{-5} (2.2×10^{-3})	0.00976	0.0918

Note: For an explanation of the numerical LCF values, please refer to the dialogue box in Section 5.7.2.

These numbers are considered conservative since each shipment was projected to travel a distance equivalent to that between the Maine Yankee reactor and the proposed PFSF, passing through significant population centers. Future U.S. population growth was accounted for by increasing population exposure by 30 percent, which would be approximately equivalent to making all shipments in the year 2020. Based on this analysis, over 1 million people would share 0.0918 person-Sv (9.18 person-rem) from incident-free SNF shipments to the PFSF. The corresponding LCF risks for the general public and the transportation crew are also presented in Table 5.9. The annual and 20-year campaign LCF risks for the MEI are 5.5×10^{-8} and 1.1×10^{-6} (or about one chance in 18 million and one chance in 1 million), respectively.

5.7.2.5 Shipments to PFS: Nationwide Transportation Accident Impacts

Accident assumptions. In assessing transportation accident risk, the NRC considers both the probability and the consequences of possible transportation accidents. The probability term is obtained by multiplying the chance of any accident per unit distance, by the fraction of accidents that are severe enough to challenge a cask, and the total distance to be traveled. The accident rates used in this analysis are the same as those in the 1987 Modal Study. The railcar accident rate was 0.11 accidents per million railcar kilometers traveled. This value was based on accident data collected by the Federal Railroad Administration. Only a very severe accident could damage a spent fuel cask. The set of all possible accidents was further divided into six accident severity categories of increasing severity. Data from the Modal Study was used to define these six categories, and identify the fraction of accidents severe enough to challenge a cask. The details of this technique are given in Appendix D. The total distance traveled was determined using the INTERLINE code (see Appendix C) for the representative route from Maine Yankee to PFSF; all 4000 casks were assumed to originate from Maine Yankee.

A major factor in determining the consequences of an accident is the amount or fraction of radioactive material released during an accident. This is represented in RADTRAN by release fractions, which are defined for each of the six accident categories. The release fractions used in this assessment are from the 1987 Modal Study. Appendix D provides details on the release fractions that were used. To transport 200 casks per year, PFS has indicated that on average there would be 50 rail shipments carrying four casks each. With four casks per shipment, the amount of material released is dependent on the response of each cask to a given accident. In the incident free assessment, 200 annual shipments of one cask each were used to calculate dose risk because the mathematical result from RADTRAN4 would be the same as 50 shipments of 4 casks each; but a similar approach cannot be used for the accident assessment, because the dose risk at a given point on the route would be greatest if all 4 casks on a given shipment were damaged and released material in the accident. In this analysis it was assumed each of the four casks was damaged and released material to the same extent; this provides an upper bound to the results of the accident scenario.

Accident results. For all rail shipments to the proposed PFSF, the accident dose risk was estimated to be 0.0423 person-Sv (4.23 person-rem) annually and 0.84 person-Sv (84.6 person-rem) for the entire 20-year campaign. This equates to an accident dose risk of 0.00085 person-Sv (0.085 person-rem) per shipment. The LCF risks for the annual and 20-year campaign calculated exposures are 0.00212 and 0.042, respectively.

The four casks (including impact limiters) are widely separated from each other on the train, and are unlikely to experience the same forces in an accident. It would be reasonable to expect that in an accident, all four casks would not be damaged to the extent that each one would release material and provide a source of radiation exposure to the public. If only one of the four casks were damaged to the extent radiological material was released, the dose risks to the public as presented in the preceding paragraph would be further reduced by a factor of about 3.58, resulting in a risk of 0.0118 person-Sv (1.18 person-rem) annually and 0.24 person-Sv (24 person-rem) for the entire 20-year campaign. This equates to an accident dose risk of 0.000236 person-Sv (0.0236 person-rem) per shipment. The NRC staff believes a reasonable estimate of the risk is somewhere between the two estimates but closer to the estimate for the release from a single cask. In any event, the radiological risk from an accident during the rail transport of SNF is small.

Economic consequences. Transportation accidents resulting in a release of radioactive material would have economic costs. Accidents resulting from transportation of spent nuclear fuel from reactor sites to the proposed PFSF are covered under the Price Anderson Act. One of the objectives of the Price Anderson Act is to ensure that adequate funds are available to the public to satisfy liability claims if an accident occurs. The NRC has specific indemnity and insurance requirements for the transport of spent nuclear fuel to and from reactor sites. As a result of the Act, the nuclear power industry is insured to a maximum per incident dollar level of $9.1 billion. The Act is now structured such the entire $9.1 billion would come from private sources. Furthermore, Congress enacted legislation in 1988 that developed a method to promptly consider compensation claims of the public for liabilities resulting from nuclear accidents that exceed the $9.1 billion limit (NRC 1998a).

The NRC staff believes it is unlikely that the economic impact of a transportation accident would exceed the amount of coverage provided under the Act because only a small fraction of accidents would result in a release of radioactive material. Based upon the Modal Study analyses, the NRC staff estimates that 99.4 percent of potential rail transportation accidents would not result in a release of radioactive material, and 99.98 percent would not result in a release that exceeds the allowable limits in 10 CFR Part 71 (NUREG/CR-4829). Only a small fraction of the remaining 0.02 percent of rail transportation accidents would result in a significant release of radioactive material. Accidents that would result in a significant release of radioactivity are considered to be unlikely.

An attempt to calculate the economic costs of these unlikely accidents with any precision is speculative and difficult. The methods available to calculate the economic cost are dependent upon several uncertain variables and the calculated cost can vary significantly depending upon the location and conditions of the accident. Some of the key variables include spread of contamination, including contamination dispersion and deposition; level of development; land use (including human consumption of fruits and vegetables grown on the land as well as grains, milk, and meat from sources within the area of the accident); and cleanup standards. Because of the uncertainty in the variables, results of these methods can only be considered speculative and uncertain. A quantitative estimate of cost would require the NRC to speculate on many key variables, one of which would be the location of the accident. Therefore, the NRC staff has not attempted to quantify the economic cost of any particular accident in the FEIS. Nevertheless, the NRC staff believes that for the majority of accidents, members of the public would incur little to no economic cost, whereas an extremely small fraction of accidents could have significant economic costs.

Emergency response. Emergency responders are trained to establish an exclusion area around any potentially harmful accident involving any hazardous material and to ensure that appropriate actions are taken to limit the impact of accidents. Carriers and shippers are required to prepare emergency response plans and provide assistance and information to emergency responders under ANSI N14.27-1986(R1993). The DOT, together with its counterparts in Canada and Mexico, published the "2000 Emergency Response Guidebook," (ERG2000) for carriers and State and local first-responders to use during the initial phase of an accident involving hazardous materials. The ERG2000 sections that apply to spent fuel include instructions on controlling spills and leaks. Also, driver training is required by DOT, including crew training for emergency situations and contacting and assisting first responders.

States are recognized as responsible for protecting public health and safety during radiological transportation accidents. Federal agencies are prepared to monitor transportation accidents, and provide assistance if requested by states to do so. Eight federal Regional Coordinating Offices, funded by the DOE, are maintained throughout the U.S. Personnel in these offices are on 24-hour call, and are capable of responding to such emergencies with equipment and experts that could advise on recovery and removal of the cask and site remediation. Because (1) nationwide, there are millions of shipments of radioactive material each year, for which the states already provide capable emergency response and (2) States can also obtain timely Federal-level emergency response assistance when necessary, the NRC staff concludes that significant additional cost would not be incurred, related to unique or different training to respond to potential transportation accidents involving spent fuel as compared to existing radioactive materials commerce.

5.7.2.6 Incident-Free and Accident Impacts of Intermodal Operations Near Reactor Sites

Some NRC-licensed reactors do not have direct rail access and are expected to transfer the spent fuel casks by barge or heavy haul truck (HHT) a short distance (relative to the overall route length) to the nearest rail-head for loading onto railcars. The shipment would continue from that location to Skull Valley via dedicated train. This section considers whether the use of the representative Maine Yankee-to-PFSF route is appropriate in light of these practices.

The representative route from Maine Yankee to PFSF is intended to characterize risks of shipments to PFS, regardless of their individual origins, transportation details (such as use of intermodal transfer), and reasonably foreseeable route characteristics. Therefore, the specifics of which reactors would utilize an intermodal option are not material to the FEIS conclusions. To ensure that the incident-free and accident impacts of such activities are reflected by the Maine Yankee-to-PFSF representative route, the NRC staff has reviewed two example cases involving the St. Lucie nuclear plant and Salem nuclear plant. The details of these assessments are found in Appendix D.

The incident-free radiological impacts of such activities include the dose to the crew and public during the HHT or barge movement, and the dose to workers and handlers while transferring the cask at the rail head. It is assumed that the doses to the public at the intermodal transfer point are negligible (due to a significant separation distance).

The accident impacts include the possible accidents that might occur during the HHT or barge transportation segment. Accidents at the intermodal transfer point itself could not reasonably be expected to be more challenging to casks than the 10 CFR Part 71 certification standards; therefore accidents at the intermodal transfer point leading to release are considered remote and speculative events.

The examination of the intermodal transfer near reactors (in Appendix D) concludes that the incident free and accident impacts *of an individual shipment* could exceed the incident free and accident impacts of the representative Maine Yankee-to-PFSF route. However, when one considers that this FEIS treats the entire inventory of shipments as traveling from Maine Yankee to PFSF, and only a small fraction of the inventory could travel from any given site, the overall (nationwide) transportation risk impacts for the entire action are bounded by the Maine Yankee-to-PFSF results presented in this FEIS. Indeed, based on reactor locations and rail access, most routes to PFSF would have lower risks than the Maine Yankee-to-PFSF route; some routes could have higher risks. Overall, the NRC staff finds that the Maine Yankee-to-PFSF route conservatively represents the nationwide risks of the proposed action.

5.7.2.7 Shipments from PFS: Incident-Free and Accident Impacts

This section examines the radiological risk of transporting all 4,000 SNF canisters from the proposed PFSF to the Utah-Nevada border. The SNF would remain at the proposed PFSF for a number of years, after which it would be removed and transported to a final repository. The NRC staff performed an additional assessment of shipment of SNF from the proposed PFSF to a permanent repository. Congress, in the Nuclear Waste Policy Act (NWPA), as amended, had directed the DOE to study one candidate repository, namely a repository proposed at Yucca Mountain, Nevada. To reflect the provisions of the NWPA, the NRC staff has examined the shipment of SNF via rail from the proposed PFSF on its way to a permanent repository in the western United States as if such a repository were located at Yucca Mountain, Nevada, although that location may or may not become the actual repository. Accordingly the NRC staff examined the shipment of SNF via rail from the proposed PFSF through Black Rock, Utah, to the Utah-Nevada border. It should be noted that the NRC has not received an application requesting a license for permanent geologic repository, and the NRC has not made any determination regarding any proposal to construct such a repository at Yucca Mountain, Nevada, or any other location. DOE is not currently considering any other location. However, the NRC staff recognized that Yucca Mountain may not be selected or approved as the final repository, but the assumption made is for analytical purposes in this FEIS. Further, this EIS does not dictate any particular result for future actions taken with respect to other nuclear waste management facilities (including a repository or other storage facility).

The plans beyond the Utah border are subject to decisions that have not yet been made. However, the NRC staff believes it is reasonable to assume that the impacts of future transportation to a repository would be encompassed by the impacts of the representative Maine Yankee-to-PFS route (considering factors such as distance, routing, and radioactivity). Accordingly, the specifics and details of potential repository location, design, and operations (e.g., use of a direct rail route or an intermodal facility with heavy haul segment) that are not yet certain are not included in the assessments and conclusions in this FEIS.

For the purposes of analysis, it was assumed that the SNF in the canisters would have been cooled at least 20 years prior to shipment to a repository. It was also assumed that the shipping casks designed to bring the canisters to the PFSF would be used to ship them to a repository. These assumptions are judged reasonable because this will (1) save the cost of designing, certifying, and fabricating new casks, (2) reduce potential handling activities, and (3) reduce the dose rate from the casks because of the decay of many of the isotopes that would be inside the canisters. Comparing 5-year-old fuel with 20-year-old fuel with the same burn-up, the radioactivity of the most significant isotopes will be reduced by a factor of two. To a first approximation, the dose rate is assumed to be reduced by this same ratio, i.e., to 0.065 mSv/hr (6.5 mrem/hr) at a distance of 1 m (3.3 ft) from the cask surface. However, the population of Utah is expected to increase about a factor of two from 1990 (at 1.72 million) to 2040 (projected to be 3.38 million).

The net result of reducing the external dose rate from the packages and increasing the population is presented in Table 5.10 for a one-year campaign of transporting 200 casks and the 20-year campaign to remove all 4,000 casks by rail using the Skunk Ridge route. The table shows that the incident-free public risk estimate exceeds the accident risk estimate, as explained in Section 5.7.2.1. The incident-free dose to the MEI for the shipping campaign from PFSF to the Utah-Nevada border (see Section 5.7.2.4) along the route would be 5.5×10^{-7} Sv (5.5×10^{-5} rem) annually, and 1.1×10^{-5} Sv (1.1×10^{-3} rem) for the 20-year campaign.

Table 5.10. Annual and cumulative 20-year campaign radiation doses associated with SNF shipment from the proposed PFSF to the Utah-Nevada border via rail

Incident-free dose [person-Sv (person-rem)]			
Transportation crew	**Public**	**MEI dose [person-Sv (person-rem)]**	**Accident dose risk to public [person-Sv (person-rem)]**
	Annual—200 casks per year		
0.00218 (0.218)	8.0×10^{-4} (0.080)	5.5×10^{-7} (5.5×10^{-5})	2.23×10^{-4} (0.0223)
	20-year campaign—4,000 casks		
0.0436 (4.36)	0.0160 (1.60)	1.1×10^{-5} (1.1×10^{-3})	4.46×10^{-3} (0.446)

For the ITF alternative, the SNF would be shipped in the same type of casks in which the fuel was originally delivered to the proposed PFSF (for the reasons given above for the all-rail shipment scenario), and the first leg of the journey would be by heavy haul truck from the proposed PFSF to the

ITF at the Timpie rail siding. The SNF would then be loaded on a Union Pacific train for the rail portion of the trip. As described above, the fuel would have been cooled for an additional period while at PFSF. Assuming a 20-year period at the PFSF, its external dose rate would have decreased by about a factor of two prior to shipment from PFSF. Accordingly, the dose to workers who handle the casks directly, such as those who work at the ITF, would be about a factor of two less than the doses estimated for the incoming cask transfers at the ITF.

The last leg of this intermodal transportation scenario in Utah would be by train. The casks would be placed on a train, and for consistency, it is assumed that each train would handle four casks. Because the final route and mode of transportation are unknown at this time, this analysis assumes the SNF would be hauled to the Utah-Nevada border as discussed above. A summary of the radiation dose results is given in Table 5.11. Note that the dose received by the transport crew in the intermodal shipment (Table 5.11) is higher than for the crew when the shipment is entirely by rail (Table 5.10). Approximately 90 percent of the crew's dose when using the ITF is a result of transferring each cask from a heavy-haul truck to a railcar. There is also a slight increase in the dose received by the general population, primarily from the population exposure during the truck shipping phase. The incident-free dose to the MEI (see Section 5.7.2.4) along the route would be 5.5×10^{-7} Sv (5.5×10^{-5} rem) annually, and 1.1×10^{-5} Sv (1.1×10^{-3} rem) for the 20-year campaign.

Table 5.11. Annual and cumulative 20-year campaign radiation doses associated with intermodal SNF shipment from the PFSF to the Utah-Nevada border via an ITF near Timpie, Utah

Incident-free dose [person-Sv (person-rem)]			
Transportation crew	**Public**	**MEI dose [person-Sv (person-rem)]**	**Accident dose risk to public [person-Sv (person-rem)]**
	Annual—200 casks per year		
0.0669 (6.69)	0.00232 (0.232)	5.5×10^{-6} (5.5×10^{-4})	2.34×10^{-4} (0.0234)
	20-year campaign—4,000 casks		
1.34 (134)	0.0464 (4.64)	1.1×10^{-5} (1.1×10^{-3})	4.68×10^{-3} (0.468)

Tables 5.12 and 5.13 show the risks (as measured by LCFs) of the campaigns to remove SNF from the proposed PFSF and send it to the Utah-Nevada border. The incident-free risk to the MEI (see Section 5.7.2.4) along either the all-rail route or the ITF route would be 2.75×10^{-8} annually, and 5.5×10^{-7} for the 20-year campaign.

Table 5.12. Annual and cumulative 20-year campaign health risks associated with SNF shipment from the proposed PFSF to the Utah-Nevada border via rail[a,b]

Incident-free risk (LCF)[c]			
Transportation crew	**Public**	**MEI risk (LCF)**	**Accident risk to public (LCF)**
Annual—200 casks per year			
8.72×10^{-5}	4.00×10^{-5}	2.75×10^{-8}	1.12×10^{-5}
20-year campaign—4,000 casks			
1.74×10^{-3}	8.00×10^{-4}	5.5×10^{-7}	2.23×10^{-4}

[a]Each train would carry four casks and travel 570 km (354 miles) to the Utah-Nevada border.
[b]The number of LCFs presented here may be compared to the national average lifetime risk of death from cancer from all causes, which is approximately 0.25 (about 1 in 4).
[c]The crew size would be two persons for rail transport.
Note: For an explanation of the numerical LCF values, please refer to the dialogue box in Section 5.7.2

Table 5.13. Annual and cumulative 20-year campaign health risks associated with intermodal SNF shipment from the proposed PFSF to the Utah-Nevada border via an ITF near Timpie, Utah

Incident-free risk (LCF)			
Transportation crew	**Public**	**MEI risk (LCF)**	**Accident risk to public (LCF)**
Annual—200 casks per year			
2.68×10^{-3}	1.16×10^{-4}	2.75×10^{-8}	1.17×10^{-5}
20-year campaign—4,000 casks			
5.35×10^{-2}	2.32×10^{-3}	5.55×10^{-7}	2.34×10^{-4}

Note: For an explanation of the numerical LCF values, please refer to the dialogue box in Section 5.7.2

5.7.2.8 Utah and Regional Impacts

The impacts of transporting SNF in the region (i.e., considered to be in and near the state of Utah) were also analyzed in detail. To analyze the regional impacts, rail access routes and route lengths were selected to cross the Utah state borders, where possible, and to accommodate convergence points from rail lines farther away from the proposed PFSF. Five different access routes (see Figure 2.7) potentially could be used to reach the proposed site in Skull Valley, Utah. The actual distance of the identified routes varies from 330 km (220 miles) to 385 km (239 miles) due to the structure of the INTERLINE rail routing network. The characteristics of each of the five routes are described in Appendix C. It is not likely that any one route would be used to transport all 40,000 MTU. However, to present an upper bound of these impacts, each route was analyzed assuming that it was used to transport all 40,000 MTU. The radiological impacts from incident-free transportation and transportation accidents are found in Appendix D and are summarized below.

For SNF shipments to the proposed PFSF the largest incident-free dose to the public would be associated with the route to Skull Valley from Green River, Utah. The estimated annual dose to the public would be 0.00619 person-Sv (0.619 person-rem). This dose corresponds to an LCF of 3.1×10^{-4}.

For a rail accident along the Green River route, the annual dose to the public would be 0.0022 person-Sv (0.222 person-rem). This dose would produce an annual LCF of 1.11×10^{-4}.

If the ITF is constructed instead of the rail line from Skunk Ridge, the route from Green River would provide the largest incident-free doses to the public. The combined annual dose to the public for SNF shipments to the Timpie siding (from Green River) and heavy-haul along Skull Valley Road would be 0.0083 person-Sv (0.83 person-rem).

5.7.2.9 Timpie, Utah, Intermodal Transfer Facility Option: Incident-Free and Accident Impacts

In addition to construction of a new connecting rail line from Skunk Ridge to PFS, an alternative is being considered that would use the Timpie siding on the Union Pacific Railroad as an intermodal transfer facility (ITF). This section describes the radiological impacts to members of the public and to workers associated with such intermodal operations. The term, ‘Intermodal operations’ includes both transferring the transportation cask to a heavy-haul truck (HHT) and movement of that truck southward on Skull Valley Road to PFSF. Both the accident and incident-free risks of these activities are discussed.

Incident-free doses. If the new rail line is not built from Skunk Ridge, the Timpie siding on the Union Pacific rail line would be the location at which an ITF would be built. The ITF is the facility at which the transfer of SNF shipping casks from rail to truck would take place. Transportation of SNF to the proposed PFSF via an ITF near Timpie can be divided into three major phases. The first phase is to transport SNF from the reactor site to the ITF near Timpie. PFS has indicated that the cross country portion of this phase would take place using rail only. The second phase is to transfer the SNF from a railcar to a heavy-haul vehicle at the ITF. Finally, the SNF would be transported southward on Skull Valley Road using the heavy-haul vehicle to the proposed PFSF.

Table 5.14 provides estimates of the annual and 20-year campaign incident-free doses to the transportation crew and the general public for the ITF alternative. The incident-free dose to the MEI (see Section 5.7.2.4) would be 1.1×10^{-6} Sv (1.1×10^{-4} rem) annually and 2.2×10^{-5} Sv (2.2×10^{-3} rem) for the 20-year campaign. In general, comparing Tables 5.9 and 5.14, the ITF alternative results in additional worker impacts due to greater handling, but has very little effect on the impacts to the general public. Table 5.14 also presents the LCF risks to the crew and general public from exposure to the annual and 20-year campaign doses. The LCF risks to the MEI from exposure to the annual and 20-year campaign doses are 5.5×10^{-8} and 1.1×10^{-6} (or about one chance in 18 million of developing a fatal cancer from one year of operation and one chance in 1 million of developing a fatal cancer from 20 years of operation), respectively. The summary below describes how each phase of the transportation contributes to the totals displayed in Table 5.14.

Table 5.14. Incident free dose for SNF shipment from Maine Yankee to the proposed PFSF via an ITF near Timpie, Utah

Dose [person-Sv (person-rem)]			Incident-free risk (LCF)	
Transportation crew	**Public**	**MEI dose [person-Sv (person-rem)]**	**Transportation crew**	**Public**
		Annual—200 casks per year		
0.136 (13.6)	0.0942 (9.42)	1.1×10^{-6} (1.1×10^{-4})	0.0054	0.0047
		20-year campaign—4,000 casks		
2.72 (272)	1.88 (188)	2.2×10^{-5} (2.2×10^{-3})	0.108	0.094

Note: For an explanation of the numerical LCF values, please refer to the dialogue box in Section 5.7.2.

Shipments from the reactor sites to the ITF. The shipment of casks to the ITF generates almost identical doses to the transportation workers and the public at large as did the shipments moving all the way to the PFSF via the proposed Skunk Ridge rail line. This is because the distance from Maine Yankee to the ITF [4,431 km (2,747 miles)] is only slightly less than the distance from Maine Yankee to the proposed PFSF [4,476 km (2,775 miles)]. Table 5.15 presents the projected dose received by the train crew and the population for the shipments to the ITF at the Timpie siding. The incident-free dose to the MEI (see Section 5.7.2.4) along this route would be 1.1×10^{-6} Sv (1.1×10^{-4} rem) annually and 2.2×10^{-5} Sv (2.2×10^{-3} rem) for the 20-year campaign.

Table 5.15. Incident free dose for SNF shipment from Maine Yankee to the ITF via rail

Dose [person-Sv (person-rem)]			Incident-free risk (LCF)	
Transportation crew	**Public**	**MEI dose [person-Sv (person-rem)]**	**Transportation crew**	**Public**
		Annual—200 casks per year		
0.0121 (1.21)	0.0917 (9.17)	1.1×10^{-6} (1.1×10^{-4})	0.000484	0.00459
		20-year campaign—4,000 casks		
0.242 (24.2)	1.83 (183)	2.2×10^{-5} (2.2×10^{-3})	0.00968	0.0915

Note: For an explanation of the numerical LCF values, please refer to the dialogue box in Section 5.7.2.

SNF transfer at the ITF. Once the fuel is received at the ITF, the cask transfer activities that are expected to take place at that facility include radiation monitoring, release of the package tie-downs from the railcar, hoisting the cask off of the railcar with a crane and moving it to the heavy-haul trailer, and re-securing the cask to the trailer. The remaining casks would be held on the railcars until the heavy-haul trailer and its escort returns to pick up each of the remaining casks.

At the ITF the crew would consist of four handlers and a spotter, an inspector, a crane operator and a health physics staff member. These workers would be employees of PFS and are the same workers that would be involved in unloading the cask and inspection (i.e., Type 1 and Type 2 workers) and maintenance at the proposed PFSF (see Section 4.7). The handlers would attach ropes to the ends of the cask after it is released from the railcar and help guide it into a tie-down cradle on the low-boy trailer or to the temporary storage location. The spotter would give directions to the crane operator and the handlers. The inspector would ensure that all written procedures are followed. The health physics staff would monitor the movement and check the cask external surface for levels of radiation and contamination.

The assumptions and method for estimating the dose received by the ITF crew are based on an analysis of an intermodal transfer of SNF shipping casks (Neuhauser and Weiner 1992). The analysis categorized the tasks of a SNF transfer crew and estimated the time and distance from the cask to the positions taken by crew members to make the transfer. Using similar exposure times, the total dose received by the eight ITF crew members is estimated to be 0.119 person-Sv/yr (11.9 person-rem/yr), or 2.38 person-Sv (238 person-rem) over the entire 20-year campaign of shipping SNF to Skull Valley. Details of this analysis are presented in Appendix D.

The dose to members of the public during the time that casks are at the ITF awaiting transfer to the PFSF is assumed to be negligible. This is because of the remoteness of the ITF and its access restrictions. Worker dose is dependent upon the distance between casks and workers, duration of exposures, and the presence of intervening shielding. The primary source of exposure would come from the cask being moved between transportation modes. Although doses at the ITF are not regulated by NRC under Part 72, the NRC staff assumed that worker dose would be controlled by a radiation protection program, and unnecessary dose would be further controlled insofar as PFS would need to satisfy requirements to implement ALARA (as low as is reasonably achievable) concepts in its operating practices. The NRC inspection program would review PFSF site records to assure that Part 20 worker dose standards are not exceeded by radiation workers.

Truck shipments via Skull Valley Road. Use of an ITF located near Timpie would require that SNF casks be shipped the last 41 km (26 miles) to the proposed PFSF by heavy-haul vehicle. A rail siding and cask handling equipment would be available at the ITF site. Assuming the PFSF receives 200 casks per year, the ITF would transfer, on the average, four casks each week, and these casks are likely to come in on 1 to 2 trains for each 7-day period. As compared to the direct rail option that nominally assumes trains averaging 4 casks each, the ITF could handle a maximum of 3 casks per single purpose train. To achieve the desired receipt rate of 4 casks per week, 2 equivalent incoming trains per week carrying 2 casks would be required. (Note that the nationwide radiological impacts are the same in either case, because each cask was assumed to be a separate radiation source independent of the train length, and the dose from one cask was multiplied by 200 to get the annual impact). It is anticipated that for the maximum train size of 3 loaded cask cars, it would take approximately 28 work hours to complete the transfer of the last cask to the heavy haul truck for delivery to PFSF. One of the casks would be transferred from its railcar onto a heavy-haul truck (see

Figure 2.8). The other casks would remain on the railcars until the heavy-haul truck returned from the PFSF, whereupon they would be transferred to the HHT, one at a time, and the shipping sequence would be repeated.

Shipments from the ITF to the proposed PFSF would be made only during daylight hours. Each truck shipment to the PFSF would be accompanied by escorts: one vehicle in front and one at the rear of the heavy-haul tractor/trailer in accordance with Utah Department of Transportation Regulations for Legal and Permitted Vehicles, Section 600. The heavy-haul vehicle is expected to travel at a speed of about 32 km/hr (20 mph) over the 41 km (26-mile) road to the PFSF. The trip will take approximately 1.5 hours. It is anticipated that the two pilot/escort vehicles will travel up to 300 m (1,000 ft) ahead of and behind the heavy-haul vehicle to warn travelers of the slow moving truck. Once unloaded, the heavy-haul vehicle and escorts can return to the ITF and pick up the next cask. RADTRAN4 was used to estimate the doses to the workers involved with transporting the SNF from the ITF to the proposed PFSF. Dose calculations for these intermodal shipments are discussed below and the exposure data are presented in Table 5.16.

Table 5.16. Incident free doses for SNF shipment from the ITF to the PFSF via heavy-haul vehicle

HHT crew dose[a] [person-Sv (person-rem)]	Population dose[b] [person-Sv (person-rem)]	MEI dose [person-Sv (person-rem)]	Risk (LCF)	
			HHT crew	Public
		Annual dose, 200 casks per year[c]		
0.00524 (0.524)	0.00254 (0.254)	1.1×10^{-6} (1.1×10^{-4})	0.00021	0.000127
		20-year life campaign - 4,000 casks[c]		
0.105 (10.5)	0.0508 (5.08)	2.2×10^{-5} (2.2×10^{-3})	0.0042	0.0025

[a]Assumes one driver and a dose rate of 0.02 mSv/hr (2.0 mrem/hr) in the cab; also includes exposure to four escorts
[b]The population doses have been increased by 61 percent to account for projected population increases in Utah between 1990 and 2020.
[c]Assumes 1 cask per low-boy shipment transported 41.8 km (26 miles).
Note: For an explanation of the numerical LCF values, please refer to the dialogue box in Section. 5.7.2.

Assuming there would be one driver in the truck and the dose rate in the cab is at the maximum U.S. DOT limit of 0.02 mSv/hr (2 mrem/hr), the dose to the driver would not exceed 0.03 mSv (3 mrem) for each trip. PFS could provide some small amount of additional radiation shielding for the driver, which would reduce the driver's dose to a fraction of this amount. The PFSF driver(s) would make 200 such shipments each year. Conservatively assuming that one driver and four escorts make all of these trips, the total accumulated dose to the driver of the HHT would not exceed:

(200 shipments/yr) • (0.03 mSv/shipment) = 6 mSv/yr (600 mrem/yr).

This translates to a maximum cumulative dose of 0.105 person-Sv (10.5 person-rem) for a 20-year campaign.

If the escorts drive an average of 240 m (800 ft) in front of and behind the shipping cask on the heavy-haul trailer, the dose rate in their vehicles, assuming no intermediate shielding such as the body of the vehicles they are riding in or the cab of the heavy haul truck, should not exceed 2×10^{-6} mSv/hr (0.0002 mrem/hr) (see Figure D.1 in Appendix D of this EIS). If there are two escorts in each vehicle, the four escorts would receive:

$$(200 \text{ shipments/yr}) \bullet (4 \text{ escorts/shipment}) \bullet (2 \times 10^{-6} \text{ mSv/hr per person}) \bullet (1.5 \text{ hr/shipment}) = 0.0024 \text{ person-mSv/yr } (0.24 \text{ person-mrem/yr}).$$

This translates to a maximum cumulative dose of 0.048 person-mSv (4.8 person-mrem) to the escorts for the 20-year campaign.

Information from Tables 5.15 and 5.16 has been combined with the total dose received by the ITF and local transportation crew and is presented in Table 5.14. Table 5.14 summarizes the total dose both to the working crews and the population if the ITF were used to transport SNF to the proposed PFSF. By comparing Table 5.9 with Table 5.14 it is apparent that when SNF is shipped using the ITF, the dose to the crew increases about a factor of 11 over the 20-year shipping campaign [compare 0.244 person-Sv (24.4 person-rem) with 2.73 person-Sv (273 person-rem)]. However, intermodal shipments have only a minor effect on the dose received by the population in general [1.84 person-Sv (184 person-rem) using the Skunk Ridge rail line vs. 1.88 person-Sv (188 person-rem) using the ITF] because most of the exposure to the public occurs on the cross-country rail portion of the shipment which is almost the same whether the rail shipment stops at Timpie or is carried all the way to the PFSF.

Accidents. Accident dose risk for the transport of SNF from operating reactors to the proposed PFSF via the ITF would be similar to the accident dose risk discussed above for the shipments via the Skunk Ridge rail line because the largest contributor to the risk is associated with the cross-country shipment of SNF from the reactor sites to the ITF. Accidents associated with the transfer operations at the ITF (i.e., removing the cask from the railcar and placing it onto a HHT), are considered by this assessment to have a negligible contribution to accident risk. (For example, the maximum expected drop height at the ITF would be less severe than the 10 CFR Part 71 cask design requirements). Accident dose risk is also calculated for the transport of SNF southward on Skull Valley Road by HHT to the PFSF. Using RADTRAN4, the accident dose risk from shipments southward on Skull Valley Road was determined to be 1.08×10^{-5} person-Sv (0.00108 person-rem) annually. For the 20-year campaign, this dose risk would be 0.00022 person-Sv (0.022 person-rem). This is equivalent to an LCF of 1.1×10^{-5} or about one chance in 93,000 that any individual exposed along Skull Valley Road would develop a fatal cancer from this level of exposure. These dose risk estimates reflect the expected increase in the Utah population from 1990 to 2020.

ITF option conclusion. In summary, the above analysis predicts that the Timpie ITF option represents a moderate increase in worker dose and a small increase in dose risk to members of the public, as compared to the new rail line option. This dose risk increase is primarily associated with increased cask handling during incident-free operations. As stated earlier in this section, such activities would be conducted by PFS under a radiation protection program. Overall, the impacts of either the ITF or rail line option are small.

5.7.2.10 Sabotage in Transportation

The current requirement contained in 10 CFR 73.37 for safeguarding shipments from acts of sabotage was promulgated in 1980 (see the dialogue box below). The requirements were based on analytical studies that estimated the consequences from credible sabotage events. Since sabotage is a deliberate malevolent act, a meaningful probability of likelihood cannot be assigned. Therefore, analyses of sabotage focus on the consequences of such an event.

The extensive security measures required by NRC regulations minimize the likelihood of radiological sabotage events. Moreover, the casks required to be used to transport SNF are designed to withstand very substantial impacts during transport without loss of containment integrity. The cask designs should further reduce the likelihood of release of radioactive material in the extremely unlikely event of sabotage. In view of the above, if a sabotage event were to occur, it is the judgement of the NRC staff that the consequences would not be unacceptably large.

PERFORMANCE OBJECTIVES FOR SNF PHYSICAL PROTECTION REQUIREMENTS

(1) minimize the possibilities of radiological sabotage of SNF shipments, especially within heavily populated areas; and

(2) facilitate the location and recovery of SNF shipments that may have come under the control of unauthorized persons.

To achieve these objectives, the physical protection shall:

(1) provide for early detection and assessment of attempts by unauthorized parties to gain access or control over SNF shipments,

(2) provide for notification to the appropriate authorities of any attempt to sabotage a SNF shipment, and

(3) impede attempts of radiological sabotage of SNF within heavily populated areas, or attempts to illicitly move SNF shipments into heavily populated areas until response forces arrive.

To achieve these objectives, detailed requirements are set forth in NRC regulations for physical protection plans to be established and maintained by NRC licensees.

5.7.2.11 Conclusions

Because the analyses performed for this FEIS used consistently conservative assumptions, the NRC staff has confidence that the actual transportation risks associated with the proposed PFSF will not be higher than those reported here. Based on the foregoing, the staff finds that annual and cumulative radiological impacts of transporting SNF to the proposed PFSF are small. Also, the analytical results for transportation of SNF to and from the proposed PFSF are consistent with earlier analyses of SNF risks reported in NUREG-0170.

5.7.3 Mitigation Measures

The human health impacts from transportation of SNF would be small and, therefore, consideration of additional mitigation measures (i.e., beyond those required by existing regulations or incorporated into the design of the shipping casks) is not warranted.

5.8 Other Impacts

5.8.1 Noise

5.8.1.1 Construction Impacts

Noise impacts would result from construction of a rail line or an ITF. Construction, excavation, and earthwork activities can generate noise levels up to 95 dB (EPA 1974, 1978) in the frequency range of human hearing [dB(A)]. This noise level applies at a reference distance of 15 m (50 ft) from the source. Noise levels decrease by about 6 dB(A) for each doubling of distance from the source, although further reduction occurs when the sound energy has traveled far enough to have been appreciably reduced by absorption into the atmosphere. Absorption depends strongly on the frequency of the sound. Typical absorption of low-frequency construction-related sounds is about 1 dB(A) per km (1 dB per 0.6 mile) (Campanella 1992).

Construction of a new rail line could generate daytime noise levels of up to 95 dB(A) [at 15 m (50 ft) from the source for brief periods. At distances greater than about 4 km (2.5 miles), expected maximum noise levels from construction would be less than the 45 dB(A) recommended by EPA (1978) for protection against indoor activity interference and annoyance. Because of the remote location of the rail line, people other than construction workers are not likely to be within 4 km (2.5 miles) of those construction activities. When such activities would occur near Interstate 80 (such as for the Skunk Ridge rail siding or the ITF, they would not produce much additional noise for automobile passengers, as is verifiable from experience traveling near construction areas along major highways. For vehicle passengers traveling along Interstate 80, this noise would be difficult to distinguish from the background traffic noise [typically around 75 dB(A) for an automobile passenger (EPA 1978)] at distances of 200 m (650 ft) or more from the construction

5.8.1.2 Impacts During Operations

The loudest potential noise source associated with the operation of a delivery locomotive would be the train whistle. These whistles must be loud for safety reasons, and can reach levels of 110 dB(A) at 15 m (50 ft). Train whistles are often audible at distances greater than 1.6 km (1 mile) during daytime hours, and would be audible at even greater distances where background levels are as low as in Skull Valley. However, at distances greater than 1 km, the absorption of sound energy by the atmosphere is no longer negligible, and noise decreases by more than 6 dB(A) for each doubling of distance from the source, especially in the higher frequencies corresponding to a whistle (Campanella 1992). Further, any train whistles that may sound (e.g., at grade crossings) would be in a sufficiently remote area that people other than transportation personnel would not be likely to be close enough to hear it.

Routine locomotive operation would only occur during brief periods when transfer or movement of a shipping cask is taking place. Further, the trains involved would be moving slowly and would not be hauling boxcars; therefore, their noise level would not be as great as a typical train [95 dB(A)], but would be closer to the 85 dB(A) level expected for a heavy-haul truck transporting a cask to the site.

Because of the remote location of the proposed rail line and the infrequent train traffic, noise impacts from construction and operation would be expected to be small.

5.8.1.3 ITF and Use of Skull Valley Road

PFS's ER indicates that noise levels could be as high as 85 dB(A) at a distance of 15 m (50 ft) from the roadway during brief periods when heavy-haul truck transportation of casks is in progress (PFS/ER 2001). This noise level, which would be expected to occur on average about 4 times per week, is about the same as conventional tractor-trailers at normal highway speeds using Skull Valley Road. Because the heavy-haul vehicle would operate on Skull Valley Road at reduced speeds, the duration of such noise for nearby residents would be about 3 times longer than for other highway vehicles. The noise would be noticeable, and could be distracting at times. However, noise during transporation of SNF would occur only during daytime hours, when it is least likely to be annoying. Therefore, the noise impacts from this activity are expected to be moderate in the vicinity of Skull Valley Road during periods when the heavy haul vehicles are passing, and would otherwise be small.

5.8.1.4 Alternative Site B

A new rail corridor to Site B would require more construction than required for the preferred alternative because of the greater distance involved; a proportionally longer construction period would be expected. However, noise impacts from railway construction are expected to be small for rail access corridors to either Site A or Site B. If the selection of Site B would result in a more southerly location of the road from Skull Valley Road to that site, noise impacts could be appreciably greater than for Site A at the nearest residences.

Noise impacts from locomotives along the new access corridor or heavy-haul vehicles along Skull Valley Road would be the same for both Site A and Site B. If the road from Skull Valley Road to Site B is located further south than for Site A, noise impacts of operation from vehicles serving the proposed facility would also be greater at the nearest residences.

5.8.1.5 Mitigation Measures

Noise impacts can be mitigated by noise barriers, which are often costly. Such barriers are not warranted based on the level of impact. Assurance that construction-related vehicles are equipped with state-of-the-art mufflers can be very effective in reducing some of the most annoying noises from construction vehicles. Accordingly, the Cooperating Agencies propose that PFS be required to control temporary noise through the operation and maintenance of muffler systems on machinery.

Noise impacts from trains can be mitigated by noise barriers, which would be costly, would have negative aesthetic impacts, and could impede movements of animals along the right of way. Such barriers are not warranted based on the level of impact from train noise and the barrier’s negative effects. Sound propagation varies strongly with frequency; low frequency sounds (e.g., a tuba) can be heard at much greater distance than can high frequency sound (e.g., a flute) of the same energy level. Adjusting the frequency of train whistles could greatly reduce noise effects at distances beyond 1 km (0.6 mile); hence, the Cooperating Agencies recommend that PFS consider doing so.

5.8.2 Scenic Qualities

Construction and operation of the proposed rail line and siding or ITF would change the scenic quality of Skull Valley. Construction would create the short-term visual impacts of additional dust from the operation of heavy equipment on-site and additional vehicle traffic on local roads. Construction of the rail line would also have long-term visual impacts because the line would represent a visual contrast in the undeveloped area between Interstate 80 and the proposed PFSF site. Operation of the rail line would create long-term visual impacts by introducing railroad traffic to the undeveloped area between Interstate 80 and the proposed PFSF site. Operation of the ITF would have the long-term visual impacts of increasing truck traffic on Skull Valley Road.

Changes in the scenic quality of the landscape due to construction and operation of the new rail line and siding would represent moderate impacts to recreational viewers, small to moderate impacts to residents of Skull Valley, and small impacts to motorists traveling on Interstate 80. The staff concludes that construction and operation of the ITF would represent small to moderate impacts to the same groups. The following discussion explains the staff's conclusions, which are based on an analysis similar to that described in Section 4.1.8.2.

5.8.2.1 Recreational Viewers

Recreationists in Skull Valley and in areas adjacent to the valley would be able to view the new rail line and siding and the ITF. Recreationists in the Cedar Mountains would be able to view the rail line and siding (see Figure 5.3), while recreationists in the Stansbury Mountains might be able to view the ITF. However, the ITF would be located in a more developed area (i.e., adjacent to Interstate 80) than most of the new rail line, and would have less significant visual impacts. For many recreationists, particularly those seeking wilderness experiences in the Cedar Mountains, the new rail line in the midst of the nearly undeveloped landscape south of Interstate 80 would represent a noticeable contrast and a moderate visual impact.

5.8.2.2 Local Residential Viewers

The new rail line could be visible to residents of the Goshute Village because the rail line is between 5 and 20 km (3 and 12 miles) from the village. For some members who live on the Reservation, the aesthetic impact of the new rail line could be considered large. The staff concludes aesthetic impacts of the new rail line on residents would likely be moderate because its visual presence would alter the scenic qualities of Skull Valley as viewed from residential areas.

Figure 5.3. Artist's rendering of the proposed Skunk Ridge rail line as viewed from the Cedar Mountains.

5.8.2.3 Motorists on Interstate 80

The new rail line and siding and the ITF would be highly visible to motorists on Interstate 80 (see Figures 5.4 and 5.5). However, it is likely that visual impacts to these motorists would be small because they would view the new facilities in the context of existing development along Interstate 80. For example, the portion of the new rail line that would be visible from Interstate 80 would be an extension of the existing rail network that parallels Interstate 80 west of Salt Lake City. Also, it is likely that many motorists on Interstate 80 would not be as sensitive to the visual changes as some recreationists and local residents. Thus, the staff concludes that the visual impact of the proposed rail line and siding or the ITF on motorists on Interstate 80 would be small because the visual presence of these facilities would neither alter noticeably nor destabilize the scenic qualities of Skull Valley as viewed from Interstate 80.

5.8.2.4 Mitigation Measures

To the extent that they are applicable, the measures discussed in Section 4.8.2 should be used to mitigate the visual impacts of the new rail line and siding or the ITF. The Cooperating Agencies propose that PFS consult with BLM to develop an adequate plan for fire prevention, suppression, and rehabilitation during construction and operation of the rail line.

5.8.3 Recreation

Recreational uses of the land in Skull Valley include such activities as driving off-road vehicles, bird watching, and hiking. Direct and indirect impacts to recreational resources and opportunities during construction and operation of the new rail siding and corridor or the new ITF near Timpie and heavy-haul transport of SNF to the proposed site are expected to be small. The following paragraphs identify the potential for direct and indirect impacts associated with constructing each of these facilities, using these facilities to transport SNF to the proposed PFSF site, using these facilities to transport SNF to the Alternative Site B, and any mitigation measures that would reduce or ameliorate adverse impacts.

5.8.3.1 Construction Impacts

Direct impacts are primarily associated with any physical changes to those resources and opportunities that would result from construction of the transportation option. Indirect impacts are primarily associated with workers who might move into the area during construction of either of the local transportation options and who might place additional demands on existing resources and opportunities. As discussed in the following paragraphs, both direct and indirect impacts are expected to be small.

Activities associated with construction of the proposed rail line, including the movement of materials and workers to and from the rail head at Skunk Ridge and along the rail route, have the potential to affect recreational resources and opportunities. Impacts include the possible addition of obstacles (in the form of elevated roadbed) to existing unimproved roads (“jeep roads”), trails, or paths. Current unhindered access from Skull Valley to portions of the Cedar Mountains might be impaired at those locations where adequate rail crossings were not provided. The proposed rail route and alignment of the rail line from Skunk Ridge does not intersect or cross the existing Cedar Mountain WSA in the northern portion of the Cedar Mountains. The route passes within approximately 800 m (2600 ft) of

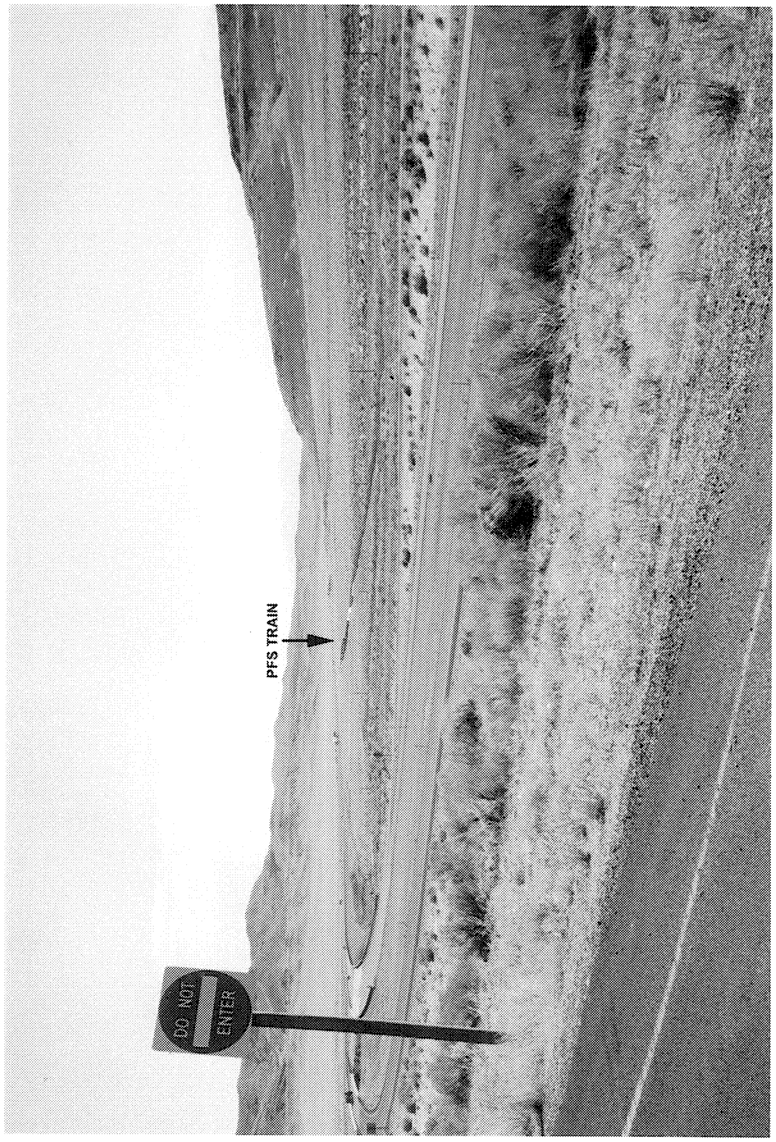


Figure 5.4. Artist's rendering of the proposed Skunk Ridge rail line as viewed from the Interstate 80 off-ramp at the Low interchange.

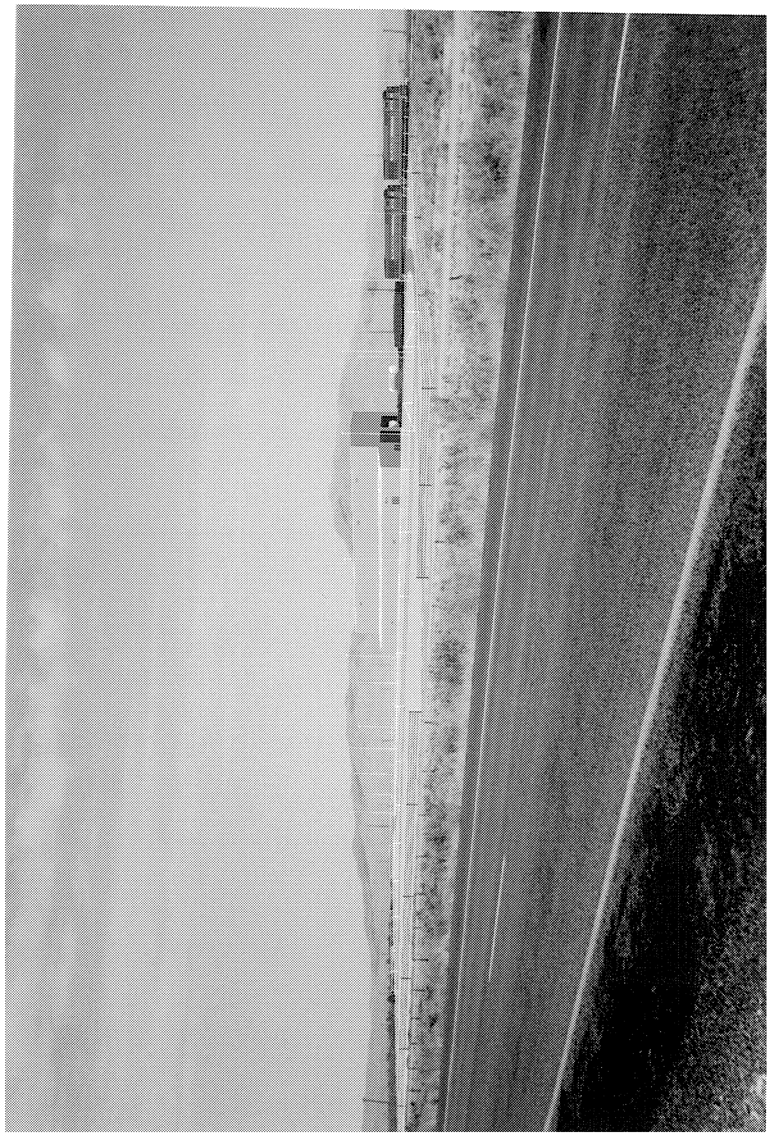


Figure 5.5. Artist's rendering of the proposed Intermodal Transfer Facility as viewed from the median of Interstate 80.

BLM lands found to contain wilderness characteristics. Hastings Pass, a segment of the California Trail, a designated National Historic Trail, is the northern boundary of newly inventoried BLM lands determined to contain wilderness characteristics. Persons wishing to use recreational resources within the Cedar Mountains WSA or other areas in the Cedar Mountains may expect delays during construction of the rail line. These impacts are expected to occur throughout the 14-month construction period. However, PFS's construction activities are expected to occur during weekdays and would not be expected to affect weekend use of the Cedar Mountain WSA or other nearby areas by recreational users.

Since demand on recreational resources varies directly with population, indirect impacts to recreational resources and opportunities are expected to be small due to the small amount of worker in-moving expected during construction of the proposed rail line. As indicated in Section 5.5, the number of in-moving workers is sufficiently small, even when added to any accompanying family members (approximately 0.3 percent of the Tooele County total population in 1996), that any increased demand placed by those workers and family members should not result in a noticeable effect on recreational resources and opportunities in the Cedar Mountains.

Activities associated with construction of the ITF near Timpie, including the movement of materials and workers to and from the construction site, have a very small potential to affect recreational resources and opportunities in the Skull Valley area. The location of the ITF, just off Interstate 80, would not affect recreational users' access to existing recreational resources and opportunities.

As with the proposed rail line, the indirect impacts are expected to be small due to the small workforce and any in-moving (approximately 0.1 percent of the Tooele County total population in 1996) associated with construction of the ITF (see Section 5.5).

5.8.3.2 Impacts During Operations

Direct and indirect impacts to recreational resources and opportunities during operation of the proposed rail line from Skunk Ridge to the proposed facility or the ITF and associated heavy-haul truck movement of SNF to the proposed facility are expected to be small. Activities associated with use of the rail line from Skunk Ridge to the proposed PFSF facility (i.e., an average of 1 to 2 rail shipments per week over the life of the facility) would have a minimal effect on recreational users of the Cedar Mountains and other areas on the western side of Skull Valley. Access to these areas over unimproved roads would not be curtailed during the operational period, except for the actual period of time it would take for a shipment to move past such an access road.

Indirect impacts to recreational resources and opportunities are expected to be small due to the small amount of worker in-moving expected during operation of the proposed rail line. The number of in-moving workers is sufficiently small, even when added to any accompanying family members, that any increased demand placed by those workers and family members should not result in a noticeable effect on recreational resources and opportunities in the Cedar Mountains.

Activities associated with operation of the ITF near Timpie, including the movement of heavy-haul trucks carrying SNF from the ITF down Skull Valley Road to the proposed facility, have a small potential to affect recreational resources and opportunities in the Skull Valley area. The location of the ITF, just off Interstate 80, would not affect recreational users' access to existing recreational resources and opportunities. However, persons wishing to use Skull Valley Road to access recreational resources such as Horseshoe Springs or the Deseret Peak Wilderness would need to expect delays during the movement of the slow-moving heavy-haul trucks, currently planned for two to four round trips per week for the life of the facility. PFS's use of Skull Valley Road is expected to occur during weekdays and would not be expected to affect weekend use of Skull Valley Road by recreational users.

As with the proposed rail line, the indirect impacts of using the ITF/heavy haul local transportation option are expected to be very small due to the small workforce (estimated at four workers) and any in-moving associated with operation of the ITF.

5.8.3.3 Alternative Site B

The alternative location (i.e., Site B) in Skull Valley for the proposed facility lies just south of the preferred site. Because Site B is very close to the preferred site, there would be no discernible differences in the anticipated impacts to recreational resources and opportunities during either construction or operation of either of the local transportation options.

5.8.3.4 Mitigation Measures

Given the small magnitude of the impacts to recreational resources and opportunities expected to result from construction and operation of either of the two local transportation options of the proposed facility, no mitigation measures were identified that would appreciably reduce the impact.

5.8.4 Wildfires

Operation of a rail line from Skunk Ridge could result in fires from equipment sparking, as has been reported to occur elsewhere in the west (AmeriScan 1999); however, approximately three fires already occur each year in Skull Valley. Table 5.17 shows the number of fires, and the size of land affected, that occurred in BLM's Salt Lake District between 1989 and 1998. The Salt Lake District includes Skull Valley.

As can be seen in Table 5.17, fires caused by lightning dominate the number of fires in the region, as well as the acreage affected by fires. Fires caused by railroads account for only 1.7 percent of the number of all fires and only 0.5 percent of all acreage affected by all fires. When only human-caused fires are considered, fires caused by railroads account for about 10 percent of those fires and about 1.3 percent of all acreage burned by human-caused fires.

PFS will own or lease and maintain the rail equipment used for delivery of SNF to the storage facility. This equipment will utilize the latest design innovations (train monitoring, breaking systems, etc.) to reduce the risk of wildfires due to rail transport. It is inherent in the design of rail equipment that sparks can be produced by the steel wheels of railroad trains in contact with the steel rails. Unlike cars and trucks, the axles on a train do not have differentials that permit the two wheels on one axle to rotate at different rates around curves. When a train moves around a curve, one of the wheels on the same axle slides along the rail to some extent, and this has a tendency to generate sparks.

Table 5.17. Number of fires and acres burned in BLM's Salt Lake District, 1989 through 1998

Cause of fire	Number of fires	BLM acres burned	Other acres burned	Acreage burned
Natural (lightning)	505	169,244	83,603	252,847
Human causes:				
Campfire	17	25	164	190
Smoking	8	1,270	287	1,557
Fire use	12	1,363	460	1,824
Incendiary	11	13,080	6,835	19,915
Equipment use	27	25,028	2,323	27,350
Railroads	15	607	1,359	1,966
Juveniles	2	11	0	11
Miscellaneous	53	67,319	28,833	96,152
Non-specific human-caused	1	0	0	0
Subtotal (all human caused)	146	108,704	40,261	148,965
Not classified	237	2,269	3,054	5,324
TOTAL	888	280,217	126,918	407,135

Notes:
(1) Data exclude false alarms.
(2) To convert acres to hectares, multiply the acreage by 0.405

Sparks can also be generated when the locomotive wheels slip while pulling a train uphill. There will be very few curves (no sharp curves) and no steep grades along the proposed Skunk Ridge rail corridor. Nevertheless, the possibility exists of sparks being produced by rail transport.

If a driver were to toss a lighted cigarette out the window of the vehicle, it is possible that a wildfire could start. This could occur whether the vehicle is a heavy haul truck or train, with similar likelihoods of starting a fire. Since trains can produce sparks from the metal rails, a condition that does not exist with the heavy haul option, it is considered that rail transport would have a slightly higher probability of causing wildfires than heavy haul truck transport. However, as noted above, the Skunk Ridge rail corridor with its minimum number of curves, no steep grades, and use of the latest equipment design innovations will minimize the risk of sparks that could lead to wildfires.

Because there is no evidence that the proposed rail line from Skunk Ridge would be more prone to cause fires than other railroad operations in BLM's Salt Lake District, it is concluded that the presence of the new rail line would not add significantly to the existing risk of fire in Skull Valley.

However, fires occurring on BLM land are investigated and a report is generated describing the cause of the fire. If it is determined that the rail line operation is the cause of the fire, the applicant would be obligated to pay for the cost of suppression.

If post-construction revegetation of the rail corridor follows BLM's fire management plan for Skull Valley (see BLM 1998c), it would be possible for the rail corridor to function as a green strip to help prevent the spread of both wildfires and those caused by operation of the rail line. Revegetation is discussed in detail in Section 5.4. The planting of species that both retard fires and also rehabilitate some of the areas where invasive annuals are currently growing could benefit vegetation by increasing biodiversity and improving local ecosystems.

The presence of the new rail line could also interfere with efforts to fight wildfires in Skull Valley. The elevated railbed could limit access across Skull Valley in an east-west direction and may impede the progress of fire-fighting personnel and equipment. The proposed rail line would include several rail crossings that could minimize the potential for the elevated railbed to adversely impact fire-fighting efforts.

5.8.4.1 Mitigation Measures

To mitigate potential impacts to fire fighting efforts, the Cooperating Agencies propose that PFS be required to consult with BLM to determine the appropriate design, number, and locations for rail crossings to allow fire suppression equipment to cross the rail line. The Cooperating Agencies propose that this mitigation measure be required (see Section 9.4.2). The Cooperating Agencies recommend that PFS further reduce the potential for fire resulting from rail line operations by the use of modern rail equipment and good maintenance.

5.9 Decommissioning

Decommissioning activities are described in Section 2.1.6; however, the actual actions taken to decommission the transportation corridor cannot be predicted at this time. If the decommissioning of the rail corridor or ITF is elected then the impacts similar to those described in the following paragraphs could occur.

5.9.1 Skunk Ridge Rail Line Corridor

Upon expiration of the right-of-way, the rail line would be removed and reclaimed in accordance with the Plan of Development and right-of-way grant from the BLM. This plan calls for the rail and ballast to be removed and the remainder of the grade to be recontoured and reseeded. PFS would also need to file an application for abandonment authority with the STB. The potential environmental impacts of abandoning the rail corridor would be addressed by further NEPA documentation at that time; however, it is expected that the types of impacts that would accompany the removal of the Skunk Ridge rail siding and rail corridor would be similar to or less than those associated with the construction of those facilities. These impacts have been determined to be small to moderate (see Sections 5.1 through 5.8). The rail bed ballast and subballast would be removed and recovered for future reuse. The steel rails could be removed and reused or recycled as scrap metal. Revegetation would occur in a manner similar to that for decommissioning and closing the proposed PFSF (see Section 4.9).

5.9.2 New ITF Near Timpie

Under the alternative of constructing and operating an ITF near Timpie, the current decommissioning plans call for the ITF to be dismantled and removed upon closure of the proposed PFSF and the area recontoured and revegetated with appropriate native plant species (see the discussion of revegetation in Section 4.9). The types of impacts that would accompany the removal of the ITF would be similar to those discussed in Sections 5.1 through 5.8 for the construction of the facility. These impacts have been determined to be small.

The rail bed ballast and subballast from the rail sidings at the ITF would be removed and recovered for future use. The steel rails could be removed and recycled as scrap metal. The foundations of the building, the loop road, and the access road would be demolished and converted into solid waste that would be sent to an appropriate landfill for disposal.

5.9.3 Potential Worker Injuries During Decommissioning

The proposed rail line may be left in place for future uses. However, should the rail line be decommissioned, it is assumed that it would take the same amount of time and number of workers to complete the decommissioning activities as it would take originally to construct the rail line. Thus, the estimates above for construction of the rail line can be applied to decommissioning (see Table 5.4). Using this same line of reasoning, the estimates above for the construction of the ITF can also be applied to its decommissioning.

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6. SUMMARY OF IMPACTS

Chapter 4 presents the potential environmental impacts of constructing and operating the proposed PFSF on the Reservation. Chapter 5 presents the environmental impacts of constructing and operating new SNF transportation facilities in Skull Valley and transporting SNF to the proposed PFSF. This chapter combines the findings of Chapters 4 and 5 and presents the potential environmental impacts from the perspective of the whole project as proposed by PFS. This chapter presents and summarizes the information needed to compare the potential environmental impacts among and between alternatives. A detailed comparison is contained in Chapter 9. In addition this chapter considers impacts associated with environmental justice and the no-action alternative.

This chapter discusses the following combinations of alternatives from Chapters 4 and 5:

- Alternative 1: PFS's proposed action: Construction and operation of the proposed PFSF at Site A on the Reservation, a new rail siding at Skunk Ridge, and a new rail corridor 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 corridor as described above.
- Alternative 3: Construction and operation of the proposed PFSF at Site A, and construction and operation of a new ITF near Timpie with the 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 as described above.

This chapter presents no new analyses not already included in Chapters 4 or 5, with the exceptions of environmental justice and the no-action alternative. Rather, this chapter brings together the analyses from those previous chapters and (in Section 6.1) offers a combined interpretation of the impacts from those chapters. In addition, this chapter presents the cumulative impacts of the entire project (see Section 6.3); provides a project-wide discussion of environmental justice (see Section 6.2); discusses the unavoidable adverse environmental impacts (see Section 6.4), the relation of the short-term uses of the environment and its long-term productivity (see Section 6.5), the irreversible and irretrievable commitment of resources for the whole project (see Section 6.6); and presents the potential environmental impacts of the no-action alternative (see Section 6.7).

6.1 Impacts of the Proposed Action and Its Alternatives

Table 6.1 summarizes the significance levels of the combined impacts of constructing and operating the proposed PFSF and the proposed new transportation facilities in Skull Valley. A detailed discussion of the entries in Table 6.1 is presented in the following subsections.

6.1.1 Geology, Minerals, and Soils

This section discusses the combined impacts to the soils and economic geologic resources from the combined actions described in Chapters 4 and 5.

Table 6.1. Summary of significance levels[a] of the combined potential impacts for Skull Valley alternatives addressed in this FEIS

Potentially impacted resource or category	Proposed action (i.e., Site A with the rail corridor)—Alternative 1	Site B with the rail corridor—Alternative 2	Site A with the ITF—Alternative 3	Site B with the ITF—Alternative 4
Geology, minerals, and soils	SMALL	SMALL	SMALL	SMALL
Water resources				
Surface water	SMALL	SMALL	SMALL	SMALL
Flooding	SMALL TO MODERATE	SMALL TO MODERATE	SMALL	SMALL
Water use	SMALL	SMALL	SMALL	SMALL
Groundwater	SMALL	SMALL	SMALL	SMALL
Air quality	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE
Ecological resources				
Vegetation	SMALL	SMALL	SMALL	SMALL
Wildlife	SMALL	SMALL	SMALL	SMALL
Wetlands	SMALL	SMALL	SMALL	SMALL
Perennial and ephemeral streams	SMALL	SMALL	SMALL	SMALL
Threatened and endangered species	SMALL	SMALL	SMALL	SMALL
Socioeconomics and community resources				
Human population	SMALL	SMALL	SMALL	SMALL
Housing	SMALL	SMALL	SMALL	SMALL
Education	SMALL	SMALL	SMALL	SMALL
Utilities	SMALL	SMALL	SMALL	SMALL
Solid and sanitary waste	SMALL	SMALL	SMALL	SMALL
Traffic	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE
Economic structure[b]	SMALL TO MODERATE (but beneficial)	SMALL TO MODERATE (but beneficial)	SMALL TO MODERATE (but beneficial)	SMALL TO MODERATE (but beneficial)
Land use (including rangeland and impacts to military overflight operations)	SMALL TO MODERATE	SMALL TO MODERATE	SMALL	SMALL

Table 6.1. Continued

Potentially impacted resource or category	Proposed action (i.e., Site A with the rail corridor)—Alternative 1	Site B with the rail corridor—Alternative 2	Site A with the ITF—Alternative 3	Site B with the ITF—Alternative 4
Cultural resources	SMALL TO MODERATE	SMALL TO MODERATE	SMALL	SMALL
Human health impacts				
Non-radiological risks to workers	SMALL	SMALL	SMALL	SMALL
Radiological doses to the public	SMALL	SMALL	SMALL	SMALL
Radiological doses to workers	SMALL	SMALL	SMALL TO MODERATE	SMALL TO MODERATE
Radiological non-transportation accidents	SMALL	SMALL	SMALL	SMALL
Transportation of SNF	SMALL	SMALL	SMALL	SMALL
Radiological transportation accidents	SMALL	SMALL	SMALL	SMALL
Non-radiological transportation accidents	SMALL	SMALL	SMALL	SMALL
Noise	SMALL	SMALL	SMALL	SMALL
Scenic qualities	MODERATE	MODERATE	MODERATE	MODERATE
Recreation	SMALL	SMALL	SMALL	SMALL
Environmental justice	SMALL	SMALL	SMALL	SMALL

[a]Significance levels in this table represent the combination of impacts addressed in detail in Chapters 4 and 5 of this FEIS.
[b]Economic benefits to the Skull Valley Band would be large.

6.1.1.1 Impacts of Alternative 1

Soils and economic geologic resource impacts occur from the construction and operation of the proposed PFSF and the Skunk Ridge rail line. Soils resources used in the soil/cement pad base mixture would be permanently lost; however, they constitute only a small percentage of the similar available soils in the valley. The remainder of soils are used in project construction as slope or embankment dressing, and these soils are recoverable upon facility decommissioning. No excess soils would be generated that require off-site shipment or disposal.

Economic geologic resources (e.g. aggregate) would be required for construction, and sufficient material is available locally to meet these needs. Like the soils resource, aggregate materials used in construction are recoverable upon facility decommissioning and are not lost. Other economic geologic resources (such as minerals or oil and gas, if any) would be unavailable for exploitation during facility construction and operation. However, similar minerals are widely available elsewhere in the region.

In summary, impacts of the proposed action on the soils and economic geologic resources is small.

6.1.1.2 Impacts of Alternative 2

The impacts on the soils and economic geologic resources from Alternative 2 are similar to those from Alternative 1.

6.1.1.3 Impacts of Alternative 3

Soils and economic geologic resource impacts occur from the construction and operation of the proposed PFSF and the ITF. Soils and economic resource impacts for the proposed PFSF are the same as those in the proposed action. Fewer mineral resources would be required for construction of the ITF than the new rail line. However, since these materials are readily available locally and can be recovered at decommissioning, the impacts of this alternative are not significantly different than those associated with the proposed action.

6.1.1.4 Impacts of Alternative 4

Soils and economic geologic resource impacts for this alternative are similar to those of using Site A with the ITF.

6.1.2 Water Resources

6.1.2.1 Impacts of Alternative 1

Surface water. Construction and operation of the proposed PFSF with the new rail line and the proposed access road would have small impacts on surface water hydrology. Under extreme flooding conditions during construction, small to moderate impacts could result from soil erosion and sedimentation of surface water channels. No adverse impacts on surface water quality are anticipated.

The proposed PFSF design includes earthen berms to protect the fuel storage pads and related facilities from flooding up to and including the PMF. The access road and rail line would cross channels that carry ephemeral flows during wet seasons and 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 flood water volumes that would occur during the 100-year storm event. Some portions of the access road and rail line would 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. During extreme flooding some temporary water ponding would likely occur upstream of the access road and railroad culverts within the floodways associated with surface runoff channels.

Potential impacts related to surface water hydrology include minor localized channel alterations that would be caused by the presence and functioning of flood control berms at the proposed PFSF, and embankments and culverts associated with the site access road and the rail line. Ephemeral surface runoff in the dry washes upslope of the facility would be re-routed around the facility. Channel modifications along access routes would be minimized by use of energy dissipating structures and materials at culvert inlets and outlets; however, some changes in channel morphology and sediment distribution would likely occur within short distances upstream and downstream of channel crossings.

Groundwater. Small impacts to groundwater availability or groundwater quality could occur as a result of construction and operation of the PFSF and the rail line access.

Groundwater from wells at or near the site would be used for human consumption at the site and to provide water to the concrete batch plant at the site. The estimated peak groundwater use rate during construction would be about 20 to 40 L/min (5 to 10 gal/min). One or more wells on site would be required to provide the required groundwater volume. There is uncertainty as to the adequacy of the aquifer at the site to produce the required quantity of water required for facility construction and operation; however, PFS has identified an alternate water supply, if required.

To fulfill project construction water requirements, water would be acquired from offsite sources and transported to the site and access routes for use in dust control, soil compaction, and mixing of soil cement for the storage pad foundations. Water of sufficient quantity and quality is commercially available within trucking distance of the construction areas. Approximately 279,031 m^3 (74 million gallons) of water would be required for rail line construction, and approximately 14,327 m^3 (3.8 million gallons) for Phase 1 construction of the site. Use of groundwater from the site at the estimated rate would not be expected to impact other existing groundwater users in Skull Valley.

No activities or processes would occur at the proposed PFSF that would adversely impact groundwater quality. Stormwater runoff from the SNF storage pads and process areas, which is not expected to contain contaminants, would flow into a surface water detention basin where percolation into site soils and evaporation would occur. The facility would have two septic tanks with leach fields. In view of PFS's plan to use BMPs, and the Cooperating Agencies' proposal that PFS be responsible for clean-up in conformance with applicable standards in the event of leaks or spills of vehicle fuels, there would be no potential for petroleum contamination of groundwater.

6.1.2.2 Impacts of Alternative 2

The hydrological impacts of using Site B in Skull Valley with the rail line are expected to be small and would be similar to using Site A with the rail line, since Site B and Site A are adjacent to one another, and the site soils, surface water, and groundwater characteristics are similar.

6.1.2.3 Impacts of Alternative 3

The hydrological impacts for the option of constructing the ITF and using Skull Valley Road would be small, as discussed below.

Surface water. Potential surface water impacts using Site A with the ITF and heavy haul truck transport of the SNF shipping casks would have small impact on surface water features. There is no potential for flooding at the ITF site.

Groundwater. There would be no significant differences in groundwater use if the ITF were used rather than the rail line. Construction of the ITF would require approximately 25,800 m^3 (6.9 million gallons) of water for earthwork and cement, which would be obtained from commercial sources. There would be a somewhat smaller potential for construction-related leaks or spills of vehicle fuel if the ITF and Skull Valley Road were used rather than the proposed rail line corridor. Use of Skull Valley Road for fuel cask transport would slightly increase the possibility of vehicle accidents resulting in spills that could impact surface water or groundwater quality.

6.1.2.4 Impacts of Alternative 4

The hydrological impacts of using Site B in Skull Valley with the ITF are expected to be small and would be similar to using Site A with the ITF, since Site B and Site A are adjacent to one another, and the site soils, surface water, and groundwater characteristics are similar.

6.1.3 Air Quality

6.1.3.1 Impacts of Alternative 1

As discussed below, the temporary and localized effects of construction could produce occasional moderate impacts on air quality in the immediate vicinity of the construction activity along the proposed rail line and small impacts elsewhere. Air quality impacts of operation would be small.

Analysis using the EPA air dispersion model ISCST3 (EPA 1995), discussed in Section 4.3, indicates that air quality impacts would be largely confined to an area well within 3 km (2 miles) of any construction activities, and within much smaller distances with routine mitigation of fugitive dust. Because of the large distance between the proposed storage facility and most of the related rail line, natural air dispersion processes would greatly dilute any pollution plume arising from rail line construction before it could mix with pollutants from the proposed PFSF construction activities, and vice-versa; therefore, impacts would not be additive except when that portion of the rail line adjacent to the storage site is under construction. That case was considered in the modeling of site construction in Section 4.3, where some rail line construction was included. The impacts from construction of the rail line are described in Section 5.3. Other effects would not be additive.

Combined effects of operation would be dominated by pollutants from fossil fuel combustion by locomotives. However, air quality impacts of the switchyard locomotive and other vehicles and equipment used during operation would be small.

6.1.3.2 Impacts of Alternative 2

The impacts of Site B and the rail line would be difficult to distinguish from those for Site A with rail transport and would therefore be small to moderate. Construction would have to include about 2 percent more rail line; and proportionally (i.e., 2 percent) more pollutants would be generated each time a locomotive used the line.

6.1.3.3 Impacts of Alternative 3

As discussed below, the temporary and localized effects of construction could produce occasional moderate impacts on air quality in the immediate vicinity of the construction activity at the ITF location and small impacts elsewhere. Air quality impacts of operation would be small.

As in the case of rail transport, the distance between the ITF and the storage facility precludes any appreciable combined effects of pollution from both sources, for both construction and operation of the proposed PFSF. Road construction adjacent to the storage facility was included in the modeling of fugitive dust from construction in Section 4.3, and has therefore been considered as a part of the storage facility construction. Because the ITF would obviate the need to construct a rail line, a large amount of rail line construction would be eliminated if this combination of options were chosen, and much less construction-related dust would be generated. Air emissions from cask-transport vehicles would be similar to those of locomotives under the rail line alternatives.

6.1.3.4 Impacts of Alternative 4

The impacts of Site B with the ITF would be similar to those for Site A with an ITF facility, and would be small.

6.1.4 Ecological Resources

6.1.4.1 Impacts of Alternative 1

Vegetation. Combined direct impacts on vegetation resulting from the construction of the proposed PFSF and a rail corridor and siding to the site would involve clearing approximately 408 ha (1,008 acres) of land (Table 2.4), which is now covered primarily by degraded desert shrub/saltbush vegetation with a high proportion of non-native cheatgrass. About 29 percent [120 ha (295 acres)] of this cleared area would be occupied for the life of the project by buildings, the cask storage pads, the access road, the rail corridor and siding, and other ancillary facilities. The remaining 71 percent [288 ha (713 acres)] of the cleared area would be revegetated, either with native species or crested wheatgrass. Because (1) the total area cleared amounts to less than 0.4 percent of the land area of Skull Valley, (2) the existing vegetation is already heavily disturbed and dominated in many areas by non-native species, (3) no unique or sensitive areas of vegetation are known to occur in the vicinity of the proposed project, and (4) substantial portions of the areas cleared would be replanted with either native species or a perennial grass, the impacts on vegetation are considered to be small.

Potential indirect effects of fugitive dust from construction of the proposed PFSF and rail line on vegetation are expected to be small because dust control measures would be used throughout the construction period, and the existing vegetation in this type of environment is not sensitive to such emissions.

Direct and indirect impacts of operation of the proposed PFSF on vegetation would be small. During operation of the proposed PFSF, no additional disturbance of soils or vegetation would occur beyond that already discussed above for construction; hence no additional impacts from the disturbance of soils or vegetation should occur. Other potential impacts include additional wildfires from equipment sparking as has been reported to occur elsewhere in the west (AmeriScan 1999). No other indirect impacts to vegetation are anticipated from operation of the proposed PFSF and rail line because atmospheric emissions are expected to be minor and groundwater withdrawal at the facility would be below the rooting zone of plants.

Wildlife. As discussed above, the combined construction activities for the proposed PFSF and rail line would disturb approximately 408 ha (1,008 acres) of desert shrub/saltbush wildlife habitat. This disturbance would reduce habitats for wildlife species such as jack rabbits, small mammals, and birds. Certain species such as mule deer and pronghorn antelope might be forced to change their movement patterns due to the installation of fencing around the proposed PFSF and the elevated rail bed along the Skunk Ridge rail corridor.

During construction, wildlife, such as ground squirrels, kangaroo mice, pocket gophers, and small reptiles could be displaced or lost due to the excavation of soils. There would be a loss of nest sites for certain species of birds and burrow sites for species such as gophers and burrowing owl. This reduction of animals and wildlife habitat would have a small negative impact on the abundance of prey for predatory species, such as hawks, eagles, owls, and fox species. However, the loss of wildlife habitat due to clearing is expected to have only a small adverse impact because less than 0.4 percent of existing Skull Valley habitat would be disturbed by the combined construction activities of the proposed PFSF and rail line.

As noted above, there are no permanent streams on the site of the proposed PFSF, and the proposed Skunk Ridge rail line would cross 32 ephemeral streams (Section 2.1.1.3). These seasonally wet areas are important to many wildlife species, including pronghorn antelope and mule deer. Following BLM and STB BMPs is expected to result in only small impacts to these streams.

The operation of the proposed PFSF project would result in a number of potential impacts to wildlife. Roaming animals may need to adjust their movements and migration patterns from time to time due to the increased traffic in the area. The Skunk Ridge rail corridor would bisect areas between the western side of Skull Valley and the Cedar Mountains, and potentially affect the movement of wildlife across this area. While both pronghorn antelope and mule deer use these areas for habitat during winter, no critical wintering or fawning areas for these species are known to occur along this route. Impacts of the rail corridor on movement of wildlife are expected to be small, however, in view of the mitigation measures discussed in this FEIS to provide adequate crossings of the rail line.

During operation, wildlife could be attracted to the casks, buildings, landscaping plants and trees, power lines and poles, and light posts of the proposed PFSF. Birds, mammals, and reptiles may be attracted to the cask storage area in the winter, as this area would be warmer than the ambient air. Birds may use the proposed PFSF structures, such as the storage casks, for perching and potential nesting because of the limited perching and nesting sites now available in the vicinity of the proposed site. Although perching or nesting on or in the immediate vicinity of the storage casks could result in exposure of birds and small mammals to radiation (Section 4.4.2), only small impacts to wildlife populations are likely to occur given the radiation doses at the surface of the casks and implementation of appropriate mitigation, including a rigorous monitoring plan to discourage animals from remaining in the vicinity of the casks for any significant period.

The possibility of increased fire frequency resulting from operation of the rail line could result in some increased mortality for wildlife species that are not very mobile (i.e., small mammals and certain nesting birds). As discussed in the previous section, planting of crested wheatgrass and native species along the rail corridor would reduce the frequency of fires, and thus reduce any impacts on susceptible wildlife species. Because the frequency of wildfires is not expected to increase significantly above current levels, the impacts to small mammals and those species dependent on small mammal prey species are expected to be small.

Wetlands. The impacts to wetlands from construction of the proposed PFSF are anticipated to be small because there are no wetlands on or near the proposed PFSF or in the vicinity of the rail line and siding. The only potential impact to wetlands would be from increased recreational use of the area in the northern part of Skull Valley around Horseshoe Springs, and it should be small.

Perennial and ephemeral streams. Construction of the proposed PFSF and rail line would have only a small impact on streams. Because there are no surface water flows in the vicinity of the proposed

PFSF, no impacts to streams would occur. The proposed Skunk Ridge rail corridor would cross 32 ephemeral streams (Section 2.1.1.3). Depending upon the time of year that rail construction occurs, disturbed soils entrained by these ephemeral desert washes could create minor short-term increases in the turbidity of any water in such streams. However, these impacts on streams are expected to be small because best management practices would be used to control and limit soil erosion during construction.

Threatened and endangered species and other species of concern. No Federally listed or State-listed threatened or endangered plant species are known to be present in the vicinity of the proposed PFSF, rail line, and rail siding. Pohl's milkvetch, a State species of concern, could be present in the area of the Hickman Knolls Pit located about 9.5 km (6 miles) west of the proposed PFSF site, but has not been found at the proposed PFSF or rail corridor.

Potential impacts to threatened, endangered, and other wildlife species of special concern from the construction and operation of the proposed PFSF include loss of habitat and wildlife species being potentially exposed to radiation. Many raptors that are potentially present in Skull Valley are State or Federally listed. Another listed predatory bird, the loggerhead shrike, is also found in Skull Valley. Construction activities along the rail corridor could disturb or destroy nesting habitat important to these species. With appropriate mitigation measures (e.g., surveys prior to construction), impacts to these species could be avoided or minimized and are thus predicted to be small.

Habitat for mammals, including the BLM-listed kit fox, would be reduced by construction of the Skunk Ridge rail line. This species might also be displaced or forced to change movement or migration patterns. Since the amount of habitat is a very low percentage of the available habitat in Skull Valley, impacts to this fox are predicted to be small. Skull Valley pocket gophers could also be displaced or destroyed as a result of the construction of the rail line. With the implementation of surveys prior to construction, anticipated impacts to these gophers could be avoided or minimized, and would thus be small.

6.1.4.2 Impacts of Alternative 2

Direct and indirect impacts to vegetation from constructing and operating the proposed PFSF at Site B on the Reservation along with the proposed Skunk Ridge rail corridor and rail siding at Low would be similar to those for the proposed action. The Skunk Ridge rail corridor to Site B would require an additional 10 ha (24 acres) of land. Thus, the total area of vegetation that would be cleared under this alternative would be about 418 ha (1,032 acres). This area of disturbance is small relative to the total land area of Skull Valley. About 71 percent of the disturbed area would be revegetated after construction. The type and quality of existing vegetation at Site B and the additional area that would be used for the rail corridor are similar to that at Site A, and no unique or sensitive species or plant communities are known to be present. The impacts to vegetation from this alternative are, therefore, considered to be small.

Impacts to wildlife from constructing and operating the proposed PFSF at Site B with the rail transportation option would be small because the site and additional area needed for the rail corridor are essentially the same type of habitat as is present on Site A. Because of the longer rail corridor, an additional 10 ha (24 acres) of wildlife habitat would be lost, but there is no unique or sensitive wildlife habitat known to be present on Site B or the area needed for the additional rail corridor segment. Thus, the impact of this alternative on wildlife is expected to be small.

There are no wetlands, perennial or ephemeral streams, or threatened or endangered plant or animal species known to be present on Site B. Use of the site and area by threatened and endangered species, or species of concern would be similar to use of Site A, except that Site B is closer to known locations of Pohl's milkvetch and, thus, impacts of constructing the facility at that site could be larger than at Site A. Impacts are anticipated to be small with implementation of required mitigation.

6.1.4.3 Impacts of Alternative 3

Impacts of constructing and operating the proposed PFSF at Site A and an ITF near Timpie, and using heavy-haul vehicles to transport SNF from the rail line to the site would be small. Only 98.5 ha (243 acres) of vegetation and wildlife habitat would be cleared, and about 38 percent [37 ha (92 acres)] of the cleared area would be revegetated. Under this alternative, the amount of disturbed habitat would be less than 0.1 percent of land in Skull Valley.

Assuming the use of an ITF, impacts of constructing and operating the proposed PFSF at Site A on vegetation; wildlife; endangered, threatened, and special concern species; wetlands; and streams would be less than those for the proposed action and would be small, particularly with implementation of recommended mitigation measures.

Impacts on vegetation and wildlife of constructing and operating the ITF near Timpie would also be small because the 4.5-ha (11-acre) site is already disturbed and does not support any known unique or sensitive vegetation or wildlife habitat. None of the area to be cleared at the ITF near Timpie [4.5 ha (11 acres)] would be revegetated. There are no wetlands or perennial or ephemeral streams in the area of the proposed ITF near Timpie. No plant species of special concern are known to occur in the area of the ITF. The State-listed endangered peregrine falcon is known to have nested a few miles to the east of the ITF at the Timpie Springs Waterfowl Management Area, but it is unlikely that these birds use the proposed Timpie ITF site or would be disturbed by construction and operation of the ITF. Thus, construction and operation of the ITF would at most cause only a small impact to ecological resources at the proposed ITF or in its immediate vicinity. Less clearing of vegetation and wildlife habitat would be needed than under Alternative 1 since no rail corridor would be built and only existing roads would be used. Therefore, impacts for Alternative 3 would be less than those for Alternative 1.

6.1.4.4 Impacts of Alternative 4

Constructing and operating the proposed PFSF at Site B and an ITF near Timpie and using heavy-haul vehicles for transporting SNF from the rail line to the site would have impacts on ecological resources similar to those described for the use of Site A with the ITF because the vegetation and wildlife habitat at Site B are essentially the same as for Site A. Thus, the impacts on ecological resources are anticipated to be small with the mitigation measures proposed to be required by the Cooperating Agencies.

6.1.5 Socioeconomic and Community Resources

As described in Sections 4.5 and 5.5, impacts to the socioeconomic and community resources of the Skull Valley Band and their Reservation are indistinguishable from those to the remainder of Tooele County with the exceptions of population, land use, and economic structure. Impacts specific to the Skull Valley Band, as compared to the remainder of Tooele County, are noted in the following discussion as appropriate. Because only Skull Valley Band members and their spouses may live on the Skull Valley Reservation (see Section 6.2.1.1), impacts on Reservation population, housing, education, utilities, and solid and sanitary waste would be small.

6.1.5.1 Impacts of Alternative 1

Population. The effects of the proposed action on population would be small. As demonstrated in Sections 4.5 (construction and operation of the proposed PFSF at Site A) and 5.5 (construction and use of the rail line), the total increase in population would amount to approximately 0.6 percent of Tooele County's 1996 population during construction and less than that during operations.

Housing. The effects of the proposed action on housing are small. As demonstrated in Sections 4.5 (construction and operation of the proposed PFSF at Site A) and 5.5 (construction and use of the rail line), the total increase in housing requirements would amount 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. Even if all in-moving workers decided to locate in a single community, which is highly unlikely, the existing housing market is likely to be able to accommodate the demand.

Education. The effects of the proposed action on education are small. As demonstrated in Sections 4.5 (construction and operation of the proposed PFSF at Site A) and 5.5 (construction and use of the rail line), the total increase in school-age children would amount to approximately 0.5 percent of existing enrollment in 1997 for Tooele County during construction and somewhat less than that during operations. This increase would not place a substantial burden on the local school system.

Utilities. The effects of the proposed action on utilities are 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 that would not require additional utility hookups during construction and operations.

Solid and sanitary waste. The effects of the proposed action on the management of solid wastes are small. The actual quantities of solid wastes are expected to be small during both construction and operation of the proposed PFSF and rail line 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. Hazardous wastes, if any are generated, would be disposed at permitted facilities in accordance with their hazardous nature.

Transportation and traffic. The temporary effects of the proposed action on transportation are small to moderate. The period of greatest traffic impact would occur during the first period of the first phase of constructing the proposed PFSF (the first 6 to 8 weeks), when traffic delays along Skull Valley Road may result due to a 138 percent increase in use of the road for the movement of construction materials and workers. The contribution to adverse transportation 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.

Land use. The effects of the proposed action on land use are 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, however, could result in reduced availability of grazing resources, including access to livestock watering resources, during both construction and operation. Impacts to land use are not considered to be additive for the proposed PFSF and the proposed rail line since they are geographically distinct and different in nature. The indirect impacts (i.e., the impacts generated by in-moving workers) of both the proposed PFSF and the proposed rail line construction and use are expected to be small.

Economic structure. The effects of the proposed action on the local economic structure would be beneficial and small to moderate in magnitude. Constructing the proposed PFSF and the proposed rail line would directly result in approximately 255 jobs during the peak of construction, and many of these jobs are likely to be filled by workers from Tooele County or from other counties within commuting distance. The peak construction period may last only a few months, at which point fewer workers would be required. The labor market available in Tooele County and other counties within commuting distance is capable of supplying most if not all of these positions.

In addition to jobs, it is expected that 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. Also, there would be a large benefit to the Skull Valley Band and to Tooele County in the form of payments under the lease and the PFS-Tooele County agreement for the duration of the proposed PFSF's operation.

6.1.5.2 Impacts of Alternative 2

Because Site B is very close to Site A, there would be no discernible differences in the anticipated impacts to socioeconomic and community resources during construction and operation of the proposed PFSF if it were to be located at Site B. Similarly, the impacts due to construction and operation or use of the proposed rail line would be identical to those described above for the proposed action. Consequently, the combined impacts to socioeconomic and community resources for this alternative are considered similar, if not identical, to those identified for the proposed action.

6.1.5.3 Impacts of Alternative 3

Population. The combined effects of constructing and operating the proposed PFSF at the preferred site (Site A) and constructing and operating the ITF and transporting SNF to the proposed PFSF at Site A by heavy-haul tractor trailer along Skull Valley Road on population are small. As demonstrated in Sections 4.5 (construction and operation of the proposed PFSF at Site A) and 5.5 (construction and use of the ITF/heavy-haul local transportation option), the total increase in population would amount to approximately 0.4 percent of Tooele County's 1996 population during construction and less than that during operations.

Housing. The combined effects of constructing and operating the proposed PFSF at the preferred site (Site A) and constructing and operating the ITF and transporting SNF to the proposed PFSF at Site A by heavy-haul tractor trailer along Skull Valley Road on housing are small. As demonstrated in Sections 4.5 (construction and operation of the proposed PFSF at Site A) and 5.5 (construction and use of the ITF/heavy-haul local transportation option), the total increase in housing requirements would amount to approximately 17.2 percent of vacant housing units for sale or rent in 1990 for Tooele County during construction and approximately three-fourths that proportion during operations. Even if all in-moving workers decided to locate in a single community, which is highly unlikely, the existing housing market is likely to be able to accommodate the demand.

Education. The combined effects of constructing and operating the proposed PFSF at the preferred site (Site A) and constructing and operating the ITF and transporting SNF to the proposed PFSF at Site A by heavy-haul tractor trailer along Skull Valley Road on education are small. As demonstrated in Sections 4.5 (construction and operation of the proposed PFSF at Site A) and 5.5 (construction and use of the ITF/heavy-haul local transportation option), the total increase in school-age children would amount to approximately 0.3 percent of existing enrollment in 1997 for Tooele County during construction and somewhat less than that during operations. This increase would not place a substantial burden on the local school system.

Utilities. The combined effects of constructing and operating the proposed PFSF at the preferred site (Site A) and constructing and operating the ITF and transporting SNF to the proposed PFSF at Site A by heavy-haul tractor trailer along Skull Valley Road on utilities are small. The small number of in-moving workers would likely live in existing housing that would not require additional utility hookups during construction and operations.

Solid and sanitary waste. The combined effects of constructing and operating the proposed PFSF at Site A and constructing and operating the ITF and transporting SNF to the proposed PFSF at Site A by heavy-haul tractor trailer along Skull Valley Road on the management of solid wastes are small. The actual quantities of solid wastes are expected to be small during both construction and operation of the proposed facility 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 ITF would be reapplied for grading purposes. Hazardous wastes, if any are generated, would be disposed of at permitted facilities in accordance with their hazardous nature.

Transportation and traffic. The combined effects of constructing and operating the proposed PFSF at the proposed site (Site A) and constructing and operating the ITF and transporting SNF to the proposed PFSF at Site A by heavy-haul tractor trailer along Skull Valley Road on transportation are small to moderate. The period of greatest traffic impact would occur during the first period of the first phase of constructing the proposed PFSF (the first 6 to 8 weeks), when temporary traffic delays along Skull Valley Road may result due to a 138-percent increase in use of the road for the movement of construction materials and workers. There is the potential for increased wear and maintenance requirements on Skull Valley Road due to heavy truck traffic. 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) and would largely be spatially separate from impacts along Skull Valley Road. Impacts during operation of the proposed PFSF and use of the ITF and Skull Valley Road for the movement of SNF would be substantially less than during construction, although traffic delays may result along Skull Valley Road during the movement of fabricated steel liners and 2 to 4 shipments per week of SNF storage casks to the proposed PFSF.

Land use. The combined effects of constructing and operating the proposed PFSF at the preferred site (Site A) and constructing and operating the ITF and transporting SNF to the proposed PFSF at Site A by heavy-haul tractor trailer along Skull Valley Road on land use are small. 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 ITF would have minimal land use impacts since the site had been previously disturbed. Impacts to land use are not considered to be additive for the proposed PFSF and the ITF since they are geographically separate. The indirect impacts (i.e., the impacts generated by in-moving workers) of both the proposed PFSF and the ITF construction and use of Skull Valley Road for movement of materials, workers, SNF on land use would be expected to be small.

Economic structure. The combined effects of constructing and operating the proposed PFSF at the preferred site (Site A) and constructing and operating the ITF and transporting SNF to the proposed PFSF at Site A by heavy-haul tractor trailer along Skull Valley Road on the local economic structure would be beneficial and small to moderate in magnitude. Constructing the proposed PFSF and the ITF would result in approximately 165 jobs during the peak of construction, and many of these jobs are likely to be filled by workers from Tooele County or from other counties within commuting distance. The peak construction period may only last a few months, at which point fewer workers would be required. The labor market available in Tooele County and other counties within commuting distance is capable of supplying most if not all of these positions.

In addition to jobs, it is expected that 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. Also, there would be a large benefit to the Skull Valley Band in the form of lease payments and employment opportunities for the duration of the proposed PFSF's operation.

6.1.5.4 Impacts of Alternative 4

Because Site B is very close to Site A, there would be no discernible differences in the anticipated impacts to socioeconomic and community resources during construction and operation of the proposed PFSF if it were to be located at Site B. Similarly, the impacts due to construction and operation or use of the ITF and heavy haul transport of SNF along Skull Valley Road would be identical to those described above for the use of Site A with the ITF. Consequently, the combined impacts to socioeconomic and community resources for this alternative are considered similar, if not identical, to those identified for Site A with the ITF.

6.1.6 Cultural Resources

6.1.6.1 Impacts of Alternative 1

The impacts to cultural resources would be small to moderate. Potential impacts at the proposed PFSF site include small impacts to significant cultural resource properties, and require limited mitigation measures. 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*. These include historic properties 42TO709, 42TO1409, 42TO1410, 42TO1411, 42TO1412, 42TO1413, 42TO1416, and 42TO1417, as identified in the cultural resources Class III (intensive field survey) studies (Birnie and Newsome 2000). 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 loss of integrity to the portions of the properties being preserved outside the rail corridor. Cultural resources at the proposed PFSF project area consist of isolated surface artifacts that are not significant. Cultural resource mitigation measures for the proposed rail line will be included in the Treatment Plan resulting from the Section 106 consultation process.

6.1.6.2 Impacts of Alternative 2

In this alternative, the rail line is the same alignment as the proposed action and the proposed PFSF location, Site B, is near to Site A. Based on available cultural resources information, Sites A and B are very similar. Therefore, the potential for impacts to cultural resources would be small to moderate.

6.1.6.3 Impacts of Alternative 3

Construction and operation of the proposed PFSF at Site A would have the same potential for impacts as under the proposed action. Historic features present in the vicinity of the proposed ITF include a historic telephone line and the historic Union Pacific Railroad with associated features. An archaeological survey of this location revealed no archaeological resources within the location itself (Birnie and Newsome 2000) (see Section 5.6.1.2). Since no upgrading of the Skull Valley Road is planned, there is no potential for direct impacts to archaeological and historic properties located adjacent to the existing the highway. Therefore, the impacts to cultural resources would be small.

6.1.6.4 Impacts of Alternative 4

Under this alternative, the potential for impacts to cultural resources would be the same as outlined in Section 6.1.6.2 for Site B and the same as Section 6.1.6.3 for the proposed ITF location and the existing Skull Valley Road. Accordingly, the impact to cultural resources for this alternative would be small.

6.1.7 Human Health Impacts

6.1.7.1 Impacts of Alternative 1

Non-radiological impacts. The non-radiological health impacts for the proposed action would be small. The estimates of potentially fatal and nonfatal occupational injuries for construction and operation activities would be small for workers. As shown in Table 6.2, the total estimated number of potential fatalities for the construction and decommissioning of the proposed PFSF and rail line would be less than 1 and nonfatal injuries for construction and decommissioning would be 25 each. Table 6.2 also shows that for normal operations at the proposed PFSF and the rail line, there would be less than 1 expected potential fatality and about 67 nonfatal injuries that involved lost workdays.

Radiological impacts. The radiological impacts from the proposed action are small. The estimates of radiation doses to the general public for operation of the proposed PFSF (see Section 4.7.2.1) and transportation using the Skunk Ridge rail line (see Section 5.7.2) would be small. Operation of the proposed PFSF and transportation of SNF via the Skunk Ridge rail line would result in exposing the general public and workers to small amounts of radiation. None of the estimates of annual radiological dose to members of the public exceed 1 percent of the radiation doses that members of the general public would likely receive from natural background radiation in the United States. The risk from accidents at the proposed PFSF or during transport of the SNF are considered to be small.

Table 6.2. Estimated fatal and nonfatal occupational injuries for the construction, normal operations, and decommissioning activities at the proposed PFSF and the Skunk Ridge rail line

Activity	Estimated potentially fatal injuries	Estimated potentially nonfatal injuries (Alternatives 1, 2)
Construction		
Phase 1	0.027	6.4
Phase 2	0.030	7.1
Phase 3	0.030	7.1
Rail line	0.020	4.8
Construction total	0.11	25.4
Operations[a]		
PFSF	0.18	65.4
Rail line	0.011	1.7
Operations total	0.19	67.1
Decommissioning		
PFSF	0.088	20.6
Rail line	0.020	4.8
Decommissioning total	0.11	25.4

[a]Operations are assumed to include 20 years of operations under an initial license and 20 years of operations under a renewed license.

6.1.7.2 Impacts of Alternative 2

Non-radiological impacts. The non-radiological impacts from using Site B with the rail line would be identical to those presented above for the proposed action.

Radiological impacts. The radiological impacts from using Site B with the Skunk Ridge rail line would be indistinguishable from those of the proposed action. While Site B is 800 m (0.5 mile) closer to the nearest residence than Site A, the estimated doses at this location would be small and would be indistinguishable from those at Site A.

6.1.7.3 Impacts of Alternative 3

Non-radiological impacts. The non-radiological impacts of using Site A with the ITF would be small. The estimates for this alternative of potentially fatal and nonfatal occupational injuries for construction, operation, and decommissioning activities would be small for workers. As shown in Table 6.3, the total number of estimated fatalities for construction and decommissioning of the proposed PFSF and ITF

Table 6.3. Estimated fatal and nonfatal occupational injuries for the construction, normal operations, and decommissioning activities at the proposed PFSF and the ITF

Activity	Estimated potentially fatal injuries	Estimated potentially nonfatal injuries (Alternatives 3, 4)
Construction		
Phase 1	0.027	6.4
Phase 2	0.030	7.1
Phase 3	0.030	7.1
ITF	0.005	1.2
Construction total	0.092	21.8
Operations[a]		
PFSF	0.18	65.4
ITF	0.017	5.1
Operations total	0.20	70.5
Decommissioning		
PFSF	0.088	20.6
ITF	0.005	1.2
Decommissioning total	0.093	21.8

[a]Operations are assumed to include 20 years of operations under an initial license and 20 years of operations under a renewed license.

would be less than 1 and nonfatal injuries that include lost workdays for the construction and decommissioning would be 21.8 each, respectively. Table 6.3 also shows that there would be less than 1 fatality and about 70.5 nonfatal injuries that include lost workdays total at the proposed PFSF and the ITF for normal operations.

Radiological impacts. The radiological impacts from using Site A with the ITF would be small to moderate. The estimates of radiation doses to the general public for operation of the proposed PFSF (see Section 4.7.2.1) and transportation using the ITF (see Section 5.7.2) would be small. However, without monitoring of doses and careful attention by PFS to protection of workers, this alternative could result in exposing the workers to amounts of radiation in excess of NRC occupational exposure limits. Such a result could occur because workers involved with transporting SNF from railcars to heavy haul vehicles would also perform Category 1 and 2 tasks at the proposed PFSF. The total annual person-rem for these work activities assuming transfer of 200 casks per year is 0.646 person-Sv (64.6 person-rem) [i.e., 0.49 person-Sv (49 person-rem) for unloading casks at the proposed PFSF; 0.037 person-Sv (3.7 person-rem) for maintenance and inspection at the proposed PFSF; 0.119 person-Sv (11.9 person-rem) for handling at the ITF]. Considering that PFS has indicated that only 12 to 15 workers would be involved in these activities, this could result in individual workers receiving 0.053 Sv [5.3 rem] (for 12 workers) to 0.0431 Sv [4.31 rem] (for 15 workers) annually. Therefore, for this alternative, PFS would be required to take additional measures to ensure that its workers receive no more than 0.05 Sv (5 rem) per year, pursuant to 10 CFR Part 20 limits for occupational exposure.

None of the estimates of annual radiological doses to members of the public exceed a small fraction of 1 percent of the radiation doses members of the general public would likely receive from natural background radiation. The risk from accidents at the proposed PFSF or during transport of the SNF are considered to be small.

6.1.7.4 Impacts of Alternative 4

Non-radiological impacts. The non-radiological impacts from using Site B with the ITF would be identical to those presented above for the use of Site A and the ITF.

Radiological impacts. The radiological impacts from using Site B with the ITF would be indistinguishable from those of using Site A with the ITF. While Site B is approximately 1.6 km (1 mile) further from the ITF and 800 m (0.5 mile) closer to the nearest residence than Site A, the estimated additional doses to the public along the short extra length of Skull Valley Road, as well as the slightly larger dose to the nearest resident, would be small and would be virtually indistinguishable from the doses at Site A.

6.1.8 Other Impacts

6.1.8.1 Noise

Impacts of Alternative 1. Sounds from storage facility construction would not be audible along most of the rail line, and vice-versa, due to the large distances between them. When rail line construction would occur close to the storage facility, noise would not be additive because combined noises are dominated by the loudest source. Several proximate noise sources would not be expected to add more than about 3 decibels to the noise of the loudest source. These concepts also apply to site operation, when the delivery locomotive, switch engine, emergency generator, and a few vehicles might all be operating simultaneously. In this case, the combined noises are unlikely to be more than about 3 dB(A) greater than the loudest source, which would be the diesel switch engine whistle.

Impacts of Alternative 2. Noise impacts of Site B would be difficult to distinguish from Site A with a rail line. Noise from construction would be expected to last about 2 percent longer because the additional construction would be expected to take more time. Also, the delivery locomotive would generate noise over an additional 2 percent distance (and, presumably, for 2 percent more time) each time a delivery is made.

Impacts of Alternative 3. Sounds from construction at the storage facility would not be audible at the ITF facility, and vice-versa, due to the large distance between those sites. In any case, as noted above, noise from proximate sources tends to be dominated by the loudest source. Delivery vehicles would likely dominate the noise at the storage facility, which would otherwise be relatively quiet. An ITF facility would obviate the use of train transport and any noise that might be associated with a rail line. However, SNF heavy-haul vehicles on Skull Valley Road would add noticeable noise which could sometimes be distracting to residents along the route.

Impacts of Alternative 4. Noise impacts of Site B with the ITF would be difficult to distinguish from Site A with an ITF. Heavy-haul vehicles would generate noise over an additional 3 percent distance (and, presumably, for 3 percent more time) each time a delivery of SNF is made to the proposed PFSF at Site B.

6.1.8.2 Scenic Qualities

Impacts of Alternative 1. Construction and operation of the proposed PFSF at Site A, when combined with construction and operation of the rail line and siding, would change the scenic quality of Skull Valley by introducing an industrial presence into a largely undeveloped landscape. The NRC staff concludes that changes in the scenic quality of the landscape, primarily due to construction and operation of the proposed PFSF at Site A and the rail line and siding, would represent moderate impacts to recreational viewers, moderate impacts to residents of Skull Valley, and moderate impacts to motorists traveling Skull Valley Road. The staff concludes that the combined visual impact would be moderate because the visual presence of the proposed facilities would alter noticeably the scenic qualities of Skull Valley. The analyses explaining these conclusions are contained in Sections 4.8.2 and 5.8.2.

Impacts of Alternative 2. Construction and operation of the proposed PFSF at Site B, when combined with construction and operation of the rail line and siding, would change the scenic quality of Skull Valley by introducing an industrial presence into a largely undeveloped landscape. For visual impacts, only a minor difference exists between Site A and Site B in that the new rail line to Site B would have to be 800 m (2,600 feet) longer than the line to Site A. The NRC staff concludes that changes in the scenic quality of the landscape, primarily due to construction and operation of the proposed PFSF at Site B and the rail line and siding, would represent moderate impacts to recreational viewers, moderate impacts to residents of Skull Valley, and moderate impacts to motorists traveling Skull Valley Road. The staff concludes that the combined visual impact would be moderate because the visual presence of the proposed facilities would alter noticeably the scenic qualities of Skull Valley. The analyses explaining these conclusions are contained in Sections 4.8.2 and 5.8.2.

Impacts of Alternative 3. Construction and operation of the proposed PFSF at Site A, when combined with construction and operation of the ITF, would change the scenic quality of Skull Valley by introducing an industrial presence into a largely undeveloped landscape. The NRC staff concludes that changes in the scenic quality of the landscape, primarily due to construction and operation of the proposed PFSF at Site A and the ITF at Timpie, would represent moderate impacts to recreational viewers, moderate impacts to residents of Skull Valley, and small impacts to motorists traveling Interstate 80. The staff concludes that the combined visual impact would be moderate because the visual presence of the proposed facilities would alter noticeably the scenic qualities of Skull Valley. The analyses explaining these conclusions are contained in Sections 4.8.2 and 5.8.2.

Impacts of Alternative 4. Construction and operation of the proposed PFSF at Site B, when combined with construction and operation of the ITF, would change the scenic quality of Skull Valley by introducing an industrial presence into a largely undeveloped landscape. The NRC staff concludes that changes in the scenic quality of the landscape, primarily due to construction and operation of the proposed PFSF at Site B and the ITF at Timpie, would represent moderate impacts to recreational viewers, moderate impacts to residents of Skull Valley, and small impacts to motorists traveling Interstate 80. The staff concludes that the combined visual impact would be moderate because the visual presence of the proposed facilities would alter noticeably the scenic qualities of Skull Valley. The analyses explaining these conclusions are contained in Sections 4.8.2 and 5.8.2.

6.1.8.3 Recreation

Impacts of Alternative 1. The combined effects of constructing and operating the proposed PFSF at the preferred site (Site A) and constructing a new rail siding at Skunk Ridge and a new rail corridor connecting the Skunk Ridge siding with Site A and then transporting SNF to Site A by rail on recreational resources and opportunities are expected to be small. Construction and operation of the proposed PFSF and rail line would not prevent access to recreational resources, but these activities are likely to result in some delays or inconvenience to users wishing to access recreational resources and opportunities, particularly during construction, when (1) access to these resources in Skull Valley would be adversely affected by the movement of construction materials and workers on Skull Valley Road (i.e., for construction of the proposed PFSF) and (2) access to resources west of the proposed rail line would be affected by rail line construction. Since access to recreational resources west of the proposed rail line must be made by way of Skull Valley Road, these particular impacts are additive. During the later phases of construction and during the operations period, impacts to recreational resources and opportunities should be smaller (i.e., with much less traffic along Skull Valley Road), although there may continue to be some continuing difficulty in accessing resources west of the proposed rail line. Construction and operations of the proposed PFSF and rail line should result in small indirect impacts to recreational resources and opportunities.

Impacts of Alternative 2. Because Site B is very close to Site A, there would be no discernible differences in the anticipated impacts to recreational resources and opportunities during construction and operation of the proposed PFSF if it were to be located at Site B. Similarly, the impacts due to construction and operation or use of the proposed rail line are identical to those described in Section 6.1.8.3 for the proposed action. Consequently, the combined impacts to socioeconomic and community resources for this alternative are considered similar to those identified for the proposed action.

Impacts of Alternative 3. The combined effects of constructing and operating the proposed PFSF and a ITF near Timpie are expected to be small. The impacts due to construction and operation or use of the ITF and shipment of SNF by heavy-haul tractor trailer along Skull Valley Road to recreational resources and opportunities 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) but could result in temporary delays for users traveling along Skull Valley Road to access recreational resources and opportunities in Skull Valley during operations. The combined impacts to recreational resources and opportunities for this alternative are considered to be small during construction and operations.

Impacts of Alternative 4. Because Site B is very close to Site A, there would be no discernible differences in the anticipated impacts to recreational resources and opportunities during construction and operation of the proposed PFSF if it were to be located at Site B. Similarly, the impacts due to construction and operation or use of the ITF and heavy haul transport of SNF along Skull Valley Road are identical to those described above for the use of Site A with the ITF. Consequently, the combined impacts to recreational resources and opportunities for this alternative are considered similar to those identified for Site A with the ITF and would be small.

6.2 Environmental Justice

Executive Order 12898 (59 Fed. Reg. 7629) directs Federal executive agencies to consider environmental justice under NEPA. CEQ has provided *Guidance for Addressing Environmental Justice Under the National Environmental Policy Act* (December 1997). The Executive Order ensures that minority and low-income groups do not bear a disproportionate share of negative environmental consequences. Although NRC is an independent agency, the Commission has committed to undertake environmental justice reviews and has provided specific information requirements in Nuclear Material Safety and Safeguards (NMSS) NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," September 2001.

This environmental justice review includes an analysis of the human health and environmental impacts on low-income and minority populations resulting from the proposed action and its alternatives. The first step in the review was to analyze demographic data to identify the minority and low-income groups within the area of environmental study. Next, the impacts from the proposed action and its alternatives were evaluated to determine if the impacts disproportionately affected minority and low-income groups in an adverse manner.

For the purposes of this review, "minority" is defined as individuals who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is one where the minority population exceeds 50 percent or where the minority population of the environmental impact site is significantly greater than the minority population percentage in the geographic area of study. A "low-income" population is defined as one where the percentage of households below the poverty level in an environmental impact site is significantly greater than the low-income population percentage in the geographic area of study. Under NMSS procedures, as a general matter (and where appropriate), the NRC staff may consider differences greater than 20 percentage points to be significant (NRC/NMSS 1999). NRC policy (NRC/NMSS 1999) states that when determining the area for impact assessment for a facility located outside the city limits or in a rural area, a 6.4-km (4-mile) radius [or 130 km^2 (50 $miles^2$)] should be used.

Under NMSS procedures, additional census blocks groups may be identified by relaxing these criteria if local circumstances appear to warrant. In the current situation, the State of Utah has very low percentages of minority populations, and rural areas in the State tend to have sparsely-populated large block groups. In addition, the analysis examines transportation routes into the proposed PFSF site. As a result of the proposed action being examined and the local circumstances, the area for impact assessment was expanded to an 80 km (50 miles) radius to examine local transportation routes into the facility. The percentage criterion was left at 20 percentage points; however, the staff also examined a 10 percentage point difference to see if additional relatively small pockets of low income and minority residences could be identified. In addition, the portion of the proposed rail routes beyond the 80 km (50 mile) radius impact assessment area but within the State of Utah were also examined to determine if any minority and low-income populations exist along these routes. It is important to note that the expanded radius does not dilute the environmental justice impact of the facility, since no averaging of environmental effects takes place, but each minority community is evaluated on its own. Neither are the criteria for identifying minority and low-income communities diluted by the wider radius, since the demographic and income characteristics of each block group are individually compared against the state of Utah. Rather, it simply expands the geographic area where additional minority and low income block groups can be (and were) identified.

Usually, a minority population would be one with a minority percentage of 50 percent or a percentage 20 percentage points greater than in the geographic area of study (usually the State and counties that include the environmental impact site) because the percentage of minorities in the county is nearly identical to the percentage of minorities in the State. For example, for the State of Utah, the Native American population is 1.4 percent, and the total minority population is 8.71 percent. Therefore, a census block group within the impact assessment area with a Native American population of at least 21.4 percent or with a minority population of at least 28.7 percent would count as a minority population worthy of further study. A similar analysis is conducted for the low income population.

In some cases, minority and low-income groups may rely on environmental resources for their subsistence and other cultural practices. Therefore, NMSS guidance also specifies that the NRC staff make inquiries regarding special resource uses or dependencies of identified minority and low-income populations, including cultural practices and customs, previous environmental impacts and features of previous and current health and economic status of the identified groups. In some circumstances, these groups might be unusually vulnerable to impacts from the proposed action.

Potential resource dependencies were identified in the course of public meetings and other information supplied by the Skull Valley Band, by Ohngo Gaudadeh Devia (an organization representing part of the Skull Valley Band), and by the Confederated Tribes of the Goshute Reservation, which include members who are relatives of the Skull Valley Band, but reside on another Reservation on the Nevada-Utah border near Wendover, Utah. Also, the Cooperating Agencies sent letters to several local Federally Recognized Indian Tribes describing the proposed construction and operation of the Skunk Ridge rail line, and to solicit their concerns on the project and to inquire about whether they desired to participate in the Section 106 consultation process (see Appendix B). The Confederated Tribes of the Goshute Reservation and the Te-Moak Western Shoshone Indians of Nevada were the only tribes who indicated a continued interest in participating. Inquiries also were made by PFS to the State of Utah concerning the health status of the Skull Valley Band, and the NRC staff made additional inquiries to the Indian Health Service. The results are described below.

6.2.1 Impacts of Alternative 1

The staff examined the geographic distribution of minority and low income populations within 50 miles of the proposed PFSF and along principal rail routes within the State of Utah, based on 1990 U.S. Census data, supplemented by field inquiries by PFS to the local planning departments in Tooele and Salt Lake Counties and social service agencies in the State. The record of public comment was also reviewed to see if any groups were missed.

6.2.1.1 Demographics

Minority populations. The significant minority populations near the proposed PFSF are members of the Skull Valley Band, both on the Reservation and in the nearby town of Grantsville. There is a combined non-Reservation population of about 120 Skull Valley Band members, most of whom reside in outlying communities such as Grantsville and Salt Lake City. The Reservation population is approximately 30 persons, most of whom are Skull Valley Band members; however, some non-members, such as spouses, also live on the Reservation (see Section 3.5.1). Figure 6.1 illustrates the geographic distribution of census block groups meeting the 20 percentage point criterion for minority populations in the 1990 U.S. census within 80 km (50 miles) of the proposed PFSF. In the figure, the block group surrounding the proposed PFSF site (shaded) and 5 block groups in Salt Lake City (shaded and circled, and identified by heavy arrows) meet the 20-percentage point criterion. Table 6.4

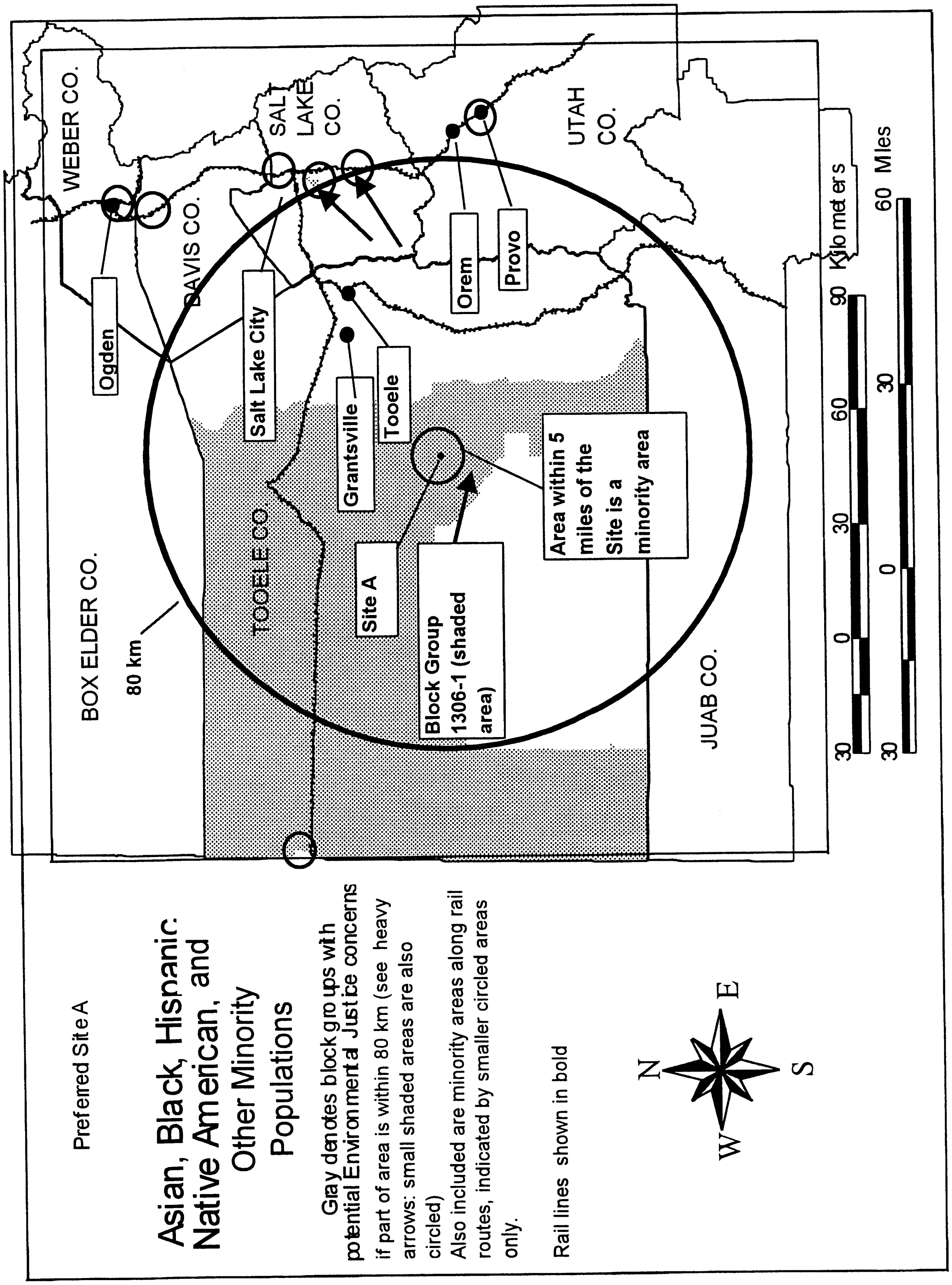

Figure 6.1. Geographic distribution of minority census block groups near the proposed PFSF site in Skull Valley.

Table 6.4. Minority and low income block groups within 80 km (50 miles) of the preferred site
(Boldface entries = 20 percent criterion; italicized entries = 10 percent criterion)

County and tract	Block group	Persons	Below poverty level (percent)	Total whites (percent)	Black (percent)	Native American (percent)	Asian and Pacific Islander (percent)	Other (percent)	Hispanic (all races) (percent)	Minorities (racial minorities plus white hispanics) (percent)
State of Utah		1,722,850	11.4	93.9	0.6	1.4	1.9	2.1	4.8	8.7
Threshold for environmental justice concerns		—	31.4	—	20.6	21.4	21.9	22.1	24.8	28.7
Utah										
0106	1	1,151	19.0	85.8	0.0	1.7	0.3	*12.3*	*16.2*	16.7
Tooele										
1306	1	338	15.0	72.8	0.0	**23.1**	1.8	2.4	6.2	*28.2*
1310	1	1,390	8.1	94.8	0.4	1.4	0.4	2.9	13.8	*20.0*
1310	3	797	16.8	89.6	0.8	1.1	1.9	6.6	*16.4*	*20.5*
1310	4	898	*24.7*	86.5	0.3	1.4	0.4	11.2	*16.4*	18.3
Salt Lake										
1028	4	2,715	16.7	71.1	4.6	1.7	*13.6*	9.0	*17.0*	**37.7**
1116	6	1,200	**35.5**	91.3	0.8	1.3	3.3	3.2	7.3	10.8
1121	1	784	*24.7*	94.9	0.3	2.4	1.3	1.1	9.2	*21.3*
112401	3	613	13.8	68.2	0.3	2.6	2.9	**25.9**	**37.4**	**50.2**
112401	4	1,657	**36.3**	82.6	0.7	3.2	2.3	11.2	**26.0**	**29.0**
112401	5	995	**52.0**	70.8	1.0	2.9	9.2	*16.1*	**31.9**	**51.6**
112402	3	2,218	15.8	87.4	0.1	0.2	7.8	4.5	10.1	*18.9*
112801	4	3,311	0.5	82.5	6.6	2.4	1.5	7.0	*14.8*	*25.7*
112908	4	1,219	**31.8**	91.4	0.4	0.5	4.4	3.3	9.8	11.8
112908	5	828	8.6	91.8	0.0	0.2	2.9	5.1	11.7	*19.4*
1131	5	1,233	*24.3*	98.3	0.4	0.5	0.1	0.7	2.6	3.5
113304	2	882	**32.0**	87.9	1.2	1.7	2.3	6.9	12.2	14.1
113304	5	1,778	**31.5**	84.1	1.3	2.5	7.5	4.6	8.5	*21.1*
113305	1	1,397	*23.1*	83.7	3.3	2.3	4.9	5.8	13.1	*21.8*
113305	3	1,174	**53.7**	57.4	0.8	10.7	**26.0**	5.1	7.8	**46.5**
113306	1	1,855	*23.0*	85.3	3.3	1.2	5.0	5.2	9.6	*20.6*
113307	2	1,469	*21.9*	84.9	0.9	1.6	7.6	5.0	8.2	17.8
113308	1	974	*23.6*	83.8	1.4	4.0	3.6	7.2	11.9	*20.9*
113308	3	1,263	*25.5*	87.6	0.9	3.4	6.1	2.0	9.5	18.2
113405	1	2,763	4.7	81.0	1.0	0.8	*13.0*	4.2	7.5	*22.8*
113406	2	1,926	21.2	84.5	0.9	1.8	7.9	4.8	8.7	*21.0*
113407	2	699	19.6	90.4	0.3	1.0	1.9	6.4	12.4	*23.9*
113519	4	1,552	*23.3*	91.3	1.5	1.0	1.3	4.8	10.4	14.2
113802	2	1,476	17.6	93.4	0.8	0.3	2.0	3.5	13.1	*19.7*
113901	3	1,636	**31.7**	90.6	0.9	0.4	2.8	5.3	*15.6*	*23.4*
Juab										
9732	2	191	20.7	73.8	0.0	*18.8*	0.0	7.3	7.9	*26.2*

shows the percentages of the various minority populations for each census block group within 80 km (50 miles) that satisfies the criteria used for this analysis. A table that shows the minority and low-income percentages for each census block group within 80 km (50 miles) of the proposed PFSF is shown in Appendix E. In the table, the census block groups meeting the 20 percentage point criterion are in boldface, and the additional block groups meeting the 10 percentage point criterion are in italics. It should be noted that for this analysis, the State was used as the area of geographic study. Therefore, the minority and low-income populations were based on a comparison to the State averages. The county averages nearest the proposed project (e.g., Tooele, Salt Lake) have minority and low-income populations similar to the State of Utah. Relaxing the criteria would expand the number of block groups counted as minority block groups within 80 km (50 miles) from 6 to 18, but would not significantly change the picture of their location. These additional block groups tend to be near those in Salt Lake City already identified using the 20-percentage point criterion. Most of Skull Valley is in a single block group (Tract 1306, Block Group 1), and it is the only block group within about 6 km (4 miles) of the proposed PFSF facility.[1] It is a minority block group.

There is a small Native American population in north-central Salt Lake City. A few block groups in the north and central parts of Salt Lake City, in the central Ogden area and between Ogden and Salt Lake City in the general vicinity of Clinton, West Point, and Clear Field, are near the proposed rail routes and met the criteria used for this analysis to determine a minority population.

Hispanics are Tooele County's principal minority group, with 2960 individuals. There is a Hispanic community in Tooele that does not rise to the 20 percent criterion used for this analysis to determine a minority population (Tract 1310 has three block groups in which the number of Hispanics as a percent of population exceeds that for the state as a whole by 10 percent or more). Hispanic populations in west and northwest Salt Lake City satisfy the 20 percent criterion. In north Salt Lake County beyond 80 km (50 miles) from the proposed PFSF, there are about a dozen block groups that satisfy the minority and low income criteria and are near the principal rail route. Also, there are concentrations of Hispanics and other minorities in Davis and Weber Counties beyond 80 km (50 miles) from the proposed PFSF site. Weber County (Ogden and vicinity) has several block groups that have majority or near-majority Hispanic populations. In some cases, these block groups appear to be within a mile of the main rail corridors to the proposed PFSF site. All of these minority block groups are indicated by the open circles in Figure 6.1.

Beyond 80 km (50 miles) from the proposed PFSF, one block group in Davis County showed almost 27 percent black (76 percent minorities), and two in Salt Lake County and one in Davis county were over 25 percent Asian. These communities are near the proposed rail routes. No other significant minority populations were identified in any census block group either close to the proposed PFSF site or along the proposed transportation corridors into the site. This indicates that other minority populations are either well-mixed into the majority population, or other minority populations are too small to be captured in the census detail.

In summary, 6 block groups within 80 km (50 miles) of the proposed PFSF were identified to satisfy the criteria used in this analysis to define a minority population. The minority population nearest to the proposed site is the Skull Valley Band living on the Reservation. As a result, the impacts on this group were analyzed to determine if a disproportionate high and adverse impact would occur from construction and operation of the proposed PFSF.

[1]PFS indicates that about 83 percent of persons living within 5 miles of the preferred site are minorities (PFS/ER 2001).

Six minority block groups within 80 km (50 miles) of the proposed PFSF and 45 minority block groups within the State of Utah, but beyond 80 km (50 miles) from the proposed PFSF site were identified to live near the proposed transportation routes (i.e., rail routes). Because minority and low income populations living near these rail routes would likely have more SNF shipments pass them, the impacts to these populations were analyzed to determine if a disproportionate high and adverse impact occurred from the transportation of SNF to the proposed PFSF.

Low-income populations. Figure 6.2 shows the distribution of low-income populations for several counties in the State of Utah, and includes the environmental study area out to 80 km (50 miles) from the proposed PFSF site. The figure identifies (by the use of heavy arrows and shading) the general location of 8 block groups meeting the 20 percentage point criterion. Detailed information on individual block groups within 80 km (50 miles) that satisfy the criteria used for this analysis is shown in Table 6.4 (block groups that meet the 20 percentage point criterion are in boldface and those meeting the 10 percentage point sensitivity criterion are in italics). Neither the Skull Valley block group nor Tooele County as a whole would be identified as a low-income population by the NMSS criteria. Of the 320 persons in the Skull Valley block group, only 15 were counted as below the poverty line in 1990. Recent inquiries by PFS indicate that this number may now be “about 17.” These may disproportionately include residents of the Reservation, but the census data do not provide this information (see Section 3.5.1). PFS indicates that over 61 percent of the people within 5 miles of the preferred site (Site A) are low- income (PFS/ER 2001). The concentration of low-income populations is slightly elevated in Grantsville, Tooele, and south/southeast Tooele County but does not satisfy the 20 percentage point criterion used for this analysis. The main low-income areas within 80 km (50 miles) of the proposed PFSF are located, as shown in Figure 6.2 by the open circles, in central and northern Salt Lake County, within a mile or two of the principal rail corridor. Beyond 80 km (50 miles) of the proposed PFSF, the principal low-income areas appear to correspond closely with the minority communities in Weber (Ogden) and in Salt Lake and Davis Counties near the rail line. In addition, there are a few non-minority low-income block groups near the rail line in the Provo-Orem area, which may, in part, reflect the presence of the student population of Brigham Young University. In summary, the nearest low-income groups in the region include populations within 6.4 km (4 miles) of the site, including individuals living on the Reservation, as well as populations in Grantsville, Tooele, the south/southeast portion of Tooele County, and near the rail line.

6.2.1.2 Assessment of Impacts

For each of the areas of technical analysis presented in this FEIS, a review of impacts to the human and natural environment was conducted to determine if any minority populations or low-income populations could be subject to disproportionately high and adverse impacts from the proposed action. The review includes potential impacts from the construction and operation of the proposed PFSF and the Skunk Ridge rail line.

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 that the construction and operation of the proposed PFSF and Skunk Ridge rail line would affect them. 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 impacts identified involved disturbance, destruction, or limitations of services from ecological and biological resources, altered

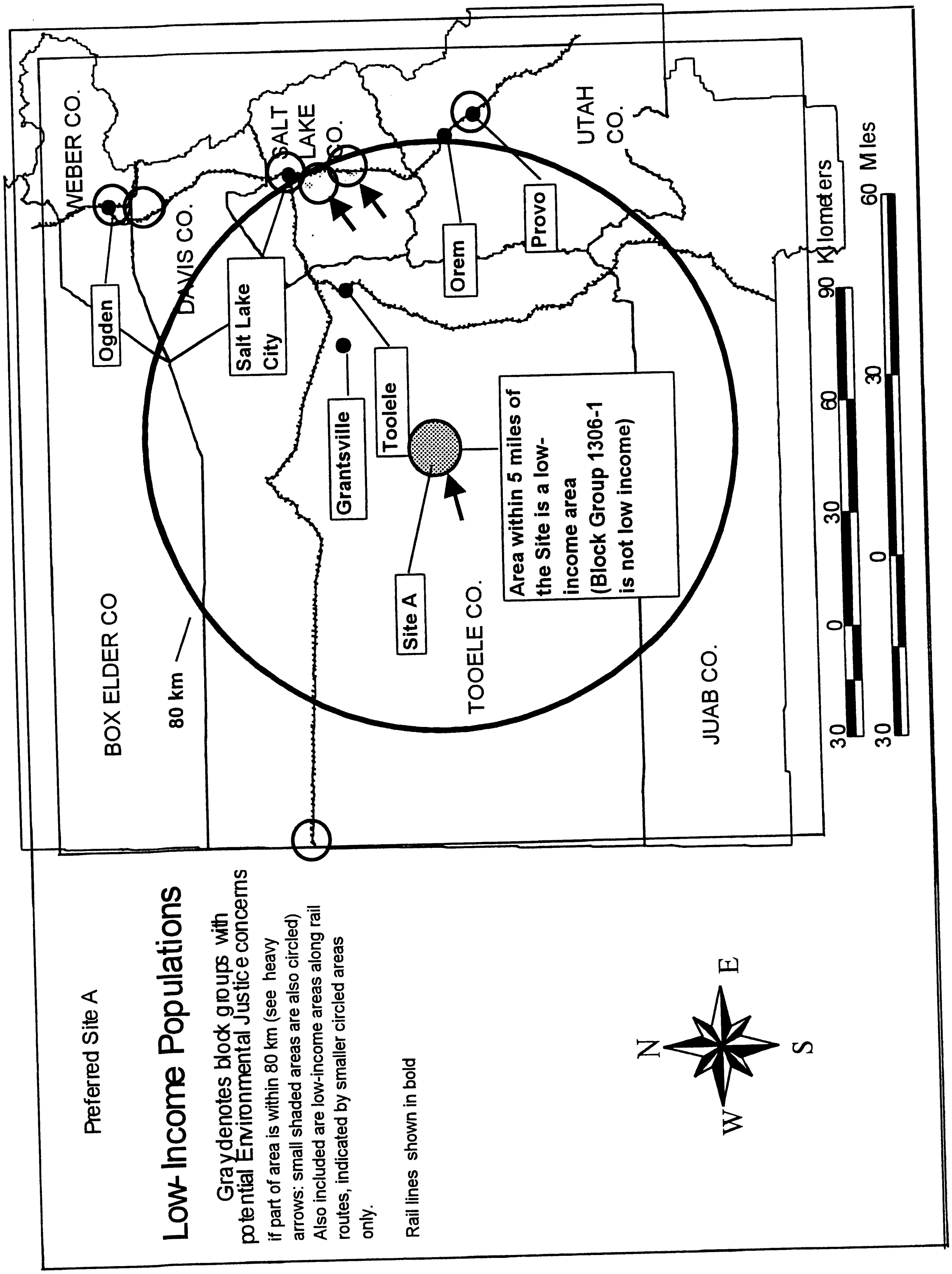

Figure 6.2. Geographic distribution of low-income census block groups near the proposed PFSF site in Skull Valley.

land forms; and a noise or visual impact to sacred sites. The level of impact to cultural values associated with natural resources would be dependent on the cultural values associated with the land disturbed under each of the alternatives. Specific concerns are as follows:

- Potential loss of property values for houses owned by Tribal members
- Potential groundwater conflicts with wells supplying water to Tribal members
- Potential loss of opportunity to collect, or potential airborne or waterborne contamination of, plant and animal resources near the proposed PFSF site (no plant and animal resources appear to be collected on the land that would be inside the proposed PFSF outer fence)
- Potential contamination (probably airborne, given the locations involved) of sacred burial sites within 0.8 km (0.5 mile) of the Skull Valley Band village.

For each area of analyses, impacts were reviewed to determine if any potential adverse impacts to the surrounding population would occur because of SNF transport, construction, normal operations, or accident conditions. If potential adverse impacts were identified, a determination was made as to whether minority or low-income populations would be disproportionately affected. Table 6.5 presents a summary of the potential impacts to low-income and minority populations, without considering any mitigation actions.

Adverse impacts are defined as negative changes to the existing conditions in the physical environment (e.g., land, air, water, wildlife, vegetation, human health, etc.) or negative socioeconomic changes. Disproportionate impacts are defined as impacts that may affect minority or low-income populations at levels appreciably greater than effects on non-minority or non-low-income populations. As discussed below, the Cooperating Agencies conclude that no disproportionately high and adverse impacts will occur to the Skull Valley Band or to minority and low income populations living near the proposed rail routes from the proposed action.

Impacts to the geology, minerals, soils; water resources; air quality; and ecology from the proposed action. Land distances and changes to land forms could result from such activities as the construction of roads and buildings at the proposed PFSF site. Fugitive dust emissions from such activities, if not properly controlled, may also be an issue at the nearest residences, which are Skull Valley Band-owned. These impacts are most likely to occur where most construction activity is likely to take place, in and around the proposed PFSF site and along the rail corridor into the site. The impacts are most likely to be seen from Skull Valley Road, Hickman Knolls, the Stansbury Mountains to the east of the site, and the Cedar Mountains to the west of the proposed PFSF. Some of these locations are sacred sites of the Skull Valley Band. Noise and dust associated with the construction and operation of the proposed PFSF are not expected to affect the nearest residents (Section 4.8), would only slightly and temporarily affect wildlife (Section 4.4), and would likely have small, if any, potential to impact the Stansbury Mountains, Cedar Mountains, or Hickman Knolls. Vegetation and wildlife are expected to be affected only within the 330 ha (820 acre) OCA, the access road, and rail corridor. The impacts to these areas are not expected to be significant (see Sections 4.4 and 5.4). As described in Sections 4.8.2, 5.8.2, and 6.1.8.2, the scenic qualities to members of the Skull Valley Band could be moderately impacted. Mitigation measures are described in Section 4.8.2. A significant increase in traffic on Skull Valley Road would occur during the initial phase of construction (see Section 4.5). This period of inconvenience would be short. Although traffic would increase, all travelers on Skull Valley Road including those workers traveling to Dugway would be affected.

Table 6.5. Potential impacts of the proposed action on minority and low-income populations

Potential impact[a]	Potentially affected minority population or low income community	Level of impact
Geology, minerals, and soils	Skull Valley Band	Small
Water Resources	Skull Valley Band	Small
Air quality	Skull Valley Band	Small
Ecology	Skull Valley Band	Small
Socioeconomic and community resources Land use Employment Population Housing values	Skull Valley Band	Small to moderate (but beneficial)
Economic structure	Skull Valley Band; other Federally Recognized Indian Tribes	Moderate to large (and beneficial)
Cultural resources	Skull Valley Band	Small to moderate
Human health Radiological Non-radiological	Skull Valley Band, low-income and minority populations near proposed rail routes	Small
Noise	Skull Valley Band	Small to moderate
Scenic qualities	Skull Valley Band	Moderate
Recreation	Skull Valley Band	Small

[a]All other potential impacts were small and not disproportionate.

Therefore, the proposed action would not result in a disproportionate impact to minority and low income groups in the area. There are expected to be no groundwater conflicts between the site and the nearest well that belongs to a member of the Skull Valley Band (Section 4.2.1.2). If there is a groundwater conflict, groundwater likely can be obtained from the Reservation supply (which could be upgraded at the same time if necessary), or from wells that could be drilled east of the site in a location where no conflict occurs. Water drawdown conflicts in any case are far more likely down gradient with private, non-minority-owned wells than they are with on-Reservation wells, which are up-gradient.

Human health impacts at the proposed PFSF. Although minority and possibly low-income populations live relatively near the proposed PFSF site [i.e., within a 5-km (3-mile) radius], including the nearest residence, which is within 3.2 km (2 miles) of the proposed PFSF, it is very unlikely that normal operations would affect them with radiological and non-radiological health impacts and other risks. Even though the nearest resident populations are Goshutes, these risks would most likely be insignificant for any offsite population for any alternative discussed in this FEIS (see Section 4.7). Inquiries by PFS and the NRC staff to the Skull Valley Band, State of Utah, and Indian Health Service found no activities, resource dependencies, pre-existing health conditions, or health service availability issues that would cause a health impact from normal operations at the proposed PFSF on the members of the Skull Valley Band, either as an individual facility or when combined with the impacts of other nearby facilities. Therefore, it is unlikely that any minority or low-income population would be disproportionately and adversely affected by normal operations of the proposed PFSF.

No credible accident scenarios for the proposed PFSF could be found with potentially significant releases of radionuclides to air or ground that could result in significant effects to any offsite populations. Thus, there is no mechanism for disproportionate environmental effects through accidents on minority residents near the proposed PFSF. Section 4.7 shows that even the most severe hypothetical accident analyzed, which is not credible (i.e., an undetected leak lasting 30 days) would result in exposure of 0.76 mSv (76 mrem) at the nearest offsite boundary. Such an exposure is over 60 times less than the 0.05 Sv (5 rem) exposure limit for accidents in 10 CFR 72.106. An exposure of 0.76 mSv (76 mrem), which is 25 percent of natural background radiation, is not considered a high and adverse impact.

Human health impacts from transportation. Based on their location with respect to rail routes through the Salt Lake City and Grantsville areas, some minority and low-income populations existing along the rail lines could be affected by radiological exposure due to either routine operations or accidents during transportation of SNF to the proposed PFSF (if such accidents took place on the rail route at these locations and if such accidents resulted in significant releases of radionuclides). However, the transportation analysis (Section 5.7) found that the impacts of transporting SNF to the proposed PFSF would be very small from normal operations or from accidents to the general public. Thus, no disproportionately high and adverse effects are expected for any particular segment of the population, including minority and low-income populations that may exist along the proposed rail routes.

Socioeconomic impacts. In addition to the socioeconomic impacts discussed in Section 4.5, three additional areas were identified during the scoping process that could adversely and potentially disproportionately impact minority and Native American populations or low-income populations. These impacts include (1) potential increases or decreases in housing values that could adversely impact access to affordable housing by low-income populations; (2) continued restrictions on access to the proposed PFSF site by all individuals;[2] and (3) reduction in the services which the proposed PFSF site provides Native Americans. These types of impacts are addressed in the following paragraphs.

Impacts of housing costs on low-income populations. Current projections (Section 3.5) show that housing prices in Skull Valley and nearby towns are expected to increase steadily from 1997 through 2040 under baseline conditions. Housing prices in Tooele County are expected to increase in part because, as the Salt Lake Valley population increases, Tooele and Grantsville populations and the local workforce with it are expected to continue to increase as well. The baseline conditions used in the impact analysis of the alternatives on the housing market in Tooele County did not assume any

[2]Note that access restrictions would apply to both the Skull Valley Band and to members of the Confederated Tribes of the Goshute Indians, some of whom have expressed an interest in access to and unrestricted use of the Reservation. The impacts have been estimated as small, and no mitigation is planned.

increase in low-income housing or rental units or housing cost subsidies and assistance by Federal, State, or local low-income housing agencies or programs. Changes from these baseline conditions or other substantial changes in the Tooele County economy could modify the net impact of the alternatives on the housing market. If the housing market in Tooele County does not experience the levels of price increases shown in the FEIS, the impact on low-income communities would be correspondingly reduced.

As set forth in Section 4.5, the population in Tooele County is expected to grow, due to the proposed PFSF workforce, by fewer than 100 persons (47 households) who are not members of the Skull Valley Band. Most of these persons are expected to live at Grantsville or Tooele and not on the Reservation. Associated population increases would be minimal, and increased demand for housing over and above the existing demand would be small. The proposed PFSF in and of itself would have minor impacts on housing prices off the Reservation and, when added to the other regional employment impacts, would not adversely impact the access of low-income populations in Grantsville and Tooele to affordable housing.

The Skull Valley housing market is isolated by geography, and part of the valley is also isolated by its Reservation status from the rest of Tooele County. The Reservation itself is not a normal housing market. The housing market on the Reservation has the following unique characteristics. Any housing built or placed on the Reservation may be owned only by members of the Skull Valley Band. A Band member seeking to build or place housing on the Reservation must obtain approval from the Skull Valley Band General Council. Any transfer of ownership of a housing structure or a building on the Reservation must also be approved by the Council. The only persons who may reside on the Reservation itself are Tribal members, spouses of Tribal members, and their children. In addition, the values of existing houses do not include the value of underlying land, which remains in trust for the Skull Valley Band and cannot be owned by any individual Band member or any person outside the Band. Housing prices also reflect the strong presence of Federal housing programs. It is not clear whether there is an active housing market on the Reservation.

Impacts on Reservation housing prices would partly depend on whether the proposed PFSF would attract Tribal members back to the Reservation and partly on the financing mechanisms used to construct housing. If some Skull Valley Band members moved back to the Reservation to take jobs at the proposed PFSF, there might be some increase in demand for housing on the Reservation, but whether returning residents simply build new housing, with no effect on the nominal value of existing homes is not known. In any case, due to the small number of workers expected to move back to the Reservation, the impact on housing prices is expected to be small. Similarly, it is not anticipated that the presence of the facility would deter Tribal members from moving back to the Reservation, and thereby potentially depress housing prices. It is equally likely that members would move back to be near employment opportunities, as is the case with, for example, nuclear power plant workers. These workers are likely to be more concerned with the ease of commuting to work, rather than potential adverse environmental impacts of the proposed PFSF.

In summary, given the above characteristics of the housing market on the Reservation, and the small number of workers expected to move back to the Reservation, the proposed PFSF project would likely have only a small effect on the housing market on the Reservation.

Impacts from restrictions on access to Reservation lands and the transportation corridor. Access to the proposed PFSF site would be restricted once construction begins. Also, land use would change along the preferred transportation corridor through the BLM lands to the north and west of the site, possibly preempting some traditional land uses. Some members of the Skull Valley Band have expressed a desire to have access to and use of the Tribal lands in the vicinity of the proposed PFSF now and in the future.

The area of restriction that would result from the construction and operation of the proposed PFSF and rail line are relatively small in size when compared to the overall size of the Reservation and the rest of Skull Valley, and these areas do not contain any known features that are unique to Skull Valley. Access to the rail line would be limited only for areas under construction. Furthermore, only one cultural artifact has been identified in the proposed areas of restriction (see Section 5.6). Therefore, impacts from restricted-access to the proposed PFSF site and any restriction associated with access to the rail corridor is considered to be small. The impacts on access to traditionally used lands and resources are expected to be small, and mitigation is not planned. Restrictions on land access to the west of the rail line could be mitigated by grade crossings, as noted in Section 5.5.

Positive socioeconomic impacts. The proposed PFSF would provide substantial lease income to the Skull Valley Band and would result in a large positive impact. In addition, the lease requires PFS to provide employment preferences first to members of the Skull Valley Band, second to children of Skull Valley Band members, and third to members of other Federally Recognized Indian Tribes. The preferences would be for all positions including skilled technical and management positions, and only to the extent they are in compliance with Federal law. These impacts would be disproportionately beneficial to the Skull Valley Band and other Native Americans.

Cultural resource impacts. Some Skull Valley Band members state that portions of the area near the proposed PFSF site have been used by Native Americans for religious purposes, hunting, and gathering of foods (e.g., deer, wild plants, sage hens, pheasants) and other plant material such as sagebrush and willows. In the scoping meeting, members of the Skull Valley Band stated that the surrounding territory near the proposed PFSF site and the Skunk Ridge rail corridor have been used to gather plants that figure prominently in the traditional practices and religion of the Native Americans. It is quite possible that these resource services which the site provides to the Native Americans could be diminished under proposed action but these resource services are not unique to these areas of Skull Valley and are readily accessible and easily obtainable in the immediate surrounding areas. The Tribal Chairman has indicated that culturally important natural resources are both scarce in the project area and inferior to the same plants in the Cedar Mountains and Tooele Valley (Section 4.6.3). Therefore, the cultural resource impacts are expected to be small.

6.2.2 Impacts of Alternative 2

Because of the close proximity of the two Skull Valley alternatives and similarities between the two sites (they are less than a mile apart, and both are on the Reservation), there is no significant difference in the impacts between Skull Valley Sites A and B from an environmental (Sections 4.1 through 4.4, 4.7), socioeconomic (Section 4.5), cultural (Section 4.6), or an environmental justice perspective. Site B would require an additional 800 m (2,600 ft) linear distance and 9.7 ha (24 acres) for the proposed rail line. This additional land would not result in any significantly different environmental justice impacts from those described for the rail line in Section 6.2.1. Therefore, the environmental justice impacts from this alternative would be nearly identical to those described above for the proposed action.

6.2.3 Impacts of Alternative 3

The construction and operation of the proposed PFSF at Site A and the ITF would potentially affect the same minority and low-income populations identified in Section 6.2.1. The environmental justice impacts from the construction and operation of the site would be the same as those described in Section 6.2.1. The area for the proposed ITF has not been identified by any groups as an area used for hunting or gathering or holding any cultural significance for any Native Americans or other minority or low-income populations. The operation of the ITF would have adverse radiological and non-radiological impacts to individuals using Skull Valley Road (see Sections 5.5 and 5.7). However, these impacts are considered to be small and would affect all users of Skull Valley Road. Therefore, no disproportionately high and adverse impacts would occur from this alternative.

6.2.4 Impact of Alternative 4

Because of the close proximity of the two Skull Valley alternatives and the other similarities between the two sites (they are less than a mile apart, and both are on the Reservation), there is no significant difference in the impacts between Skull Valley Sites A and B from an environmental (Sections 4.1 through 4.4, 4.7), socioeconomic (Section 4.5), cultural (Section 4.6), or environmental justice perspective. Therefore, the environmental justice impacts from this alternative would be nearly identical to those described above for Site A with the ITF.

6.3 Cumulative Impacts

The cumulative impacts of the proposed action are presented and discussed in this section. The impacts of the proposed action, as described in Section 6.1, are combined with other past, present, and reasonably foreseeable actions, including, where appropriate, the presence of other industrial facilities in the region (see Figure 1.1), to determine whether cumulative impacts exist. Very little development has occurred in Skull Valley, and from the information provided in Tooele County planning documents, PFS reports (PFS/ER 2001) that no new private projects are planned for Skull Valley.

6.3.1 Geology, Minerals, and Soils

Cumulative impacts of construction and operation of the proposed PFSF in Skull Valley with other proposed construction projects in the area involve the competition for and use of aggregate, crushed rock, and other mineral resources. Because there are no planned projects in Skull Valley and because of the abundance of these materials in the area, the potential for adverse cumulative impacts to geological resources is considered to be small.

6.3.2 Water Resources

Surface water. Cumulative hydrologic impacts of the proposed action are expected to be small. Some minor impacts would likely occur to surface water channels as a result of construction and operation of the proposed PFSF and access routes. Such impacts would be comparable to or less than the effects observed along existing transportation routes such as existing railroads, Skull Valley Road, and other highways. Mitigation measures that would be implemented as part of construction and operational BMPs would result in less impact from the proposed new facilities than are observed in older transportation infrastructure.

Groundwater. Most of the water used for construction of the proposed PFSF and its associated access routes would be purchased from offsite sources and transported to the points of use. There are no known plans for other projects that would require withdrawal of groundwater that, if implemented in addition to the PFSF, would potentially cause an adverse impact on groundwater availability in Skull Valley. No adverse hydrologic impact would result from obtaining water offsite to support construction in Skull Valley. Onsite water use would require less than about 40 L/min (10 gal/min) of groundwater withdrawal from the aquifer in Skull Valley. Groundwater in Skull Valley has been used historically for domestic and agricultural purposes and some wells yield up to 225 L/min (60 gal/min) of flow. These uses are expected to continue at the same rates of withdrawal that have occurred for the past several decades. The planned groundwater withdrawals for the proposed PFSF are not expected to adversely impact other groundwater users in Skull Valley during construction and operation or after decommissioning of the site. Prior to initiating construction, PFS would develop a monitoring program (as a mitigation measure; see Condition 5B in Section 9.4.2) to determine if the wells nearest the proposed PFSF are adversely impacted by groundwater withdrawals. If nearby groundwater users are adversely impacted, an alternative water supply could be used.

6.3.3 Air Quality

Cumulative air quality impacts have been obtained by including existing emissions sources and background pollutant concentrations in the analyses presented in Sections 4.3.1 and 5.3. These cumulative impacts are considered to be small; hence, no further evaluation of cumulative impacts is necessary.

No other large construction projects are planned for the Reservation or the immediately surrounding area during the most intense period of construction (Phase 1) of the proposed PFSF, and no other appreciable sources of air pollution in the area appear to be “reasonably foreseeable” during that period. Subsequent phases of construction would produce much less fugitive dust than would Phase 1. The computer-modeled concentrations of air pollutants included the effects of several additional large local sources that may appreciably influence concentrations near the proposed PFSF site, but might have relatively little influence on monitored concentrations at distant sites. These additional sources include Dugway Proving Ground and MagCorp at Rowley, as well as several smaller sources (e.g., Tooele Army Depot).

The largest contribution of the combined off-site sources to the modeled 24-hour PM-10 concentration expected on *any* day at *any* location within 10 km (6 miles) from the construction site is 10 $\mu g/m^3$, at the receptor nearest to Dugway Proving Ground (i.e., the receptor farthest from the construction area in that direction). At that location, the maximum effects of site construction on 24-hour average PM-10 concentrations would be about equal to the maximum effects from Dugway Proving Ground. However, the maximum effects of site construction at that receptor would occur when the wind is from the north, when PM-10 from the Dugway Proving Ground would be transported southward, *away* from that receptor. Therefore, these impacts would not be additive or cumulative. No NAAQS for particulate matter would be exceeded or closely approached, and cumulative impacts would be small.

As described in Section 5.3, rail line construction could occasionally produce moderate cumulative impacts to PM-10 levels on Interstate 80 due to the proximity of the construction site to the interstate.

Mitigation measures have been identified in Section 5.3.4 that would reduce the amounts of fugitive dust emitted from the rail line and rail siding construction areas.

6.3.4 Ecological Resources

There are no current, proposed, or reasonably foreseeable future projects that would have any cumulative impacts on vegetation, wildlife, or perennial/ephemeral streams, or aquatic resources related to the proposed PFSF. Therefore, the remainder of this section limits the discussion of cumulative impacts of potential future actions on ecological resources to consideration of the proposed PFSF project.

Vegetation. Constructing and operating the facility as proposed at Site A with the preferred transportation alternative of the new rail line would include clearing existing vegetation within Skull Valley. The OCA for the proposed PFSF would include about 330 ha (820 acres), and an additional 82 ha (202 acres) would be used for the access road right-of-way. Of this total area, only 94 ha (232 acres) would be cleared. About 57 ha (140 acres) of that area would remain cleared for the life of the facility, a 28-ha (68-acre) fire barrier would be planted with crested wheatgrass, and the remaining cleared area [about 10 ha (24 acres)] would be planted with native vegetation following construction.

Construction of the new rail line would require clearing vegetation and grading soil from a total of 314 ha (776 acres) to reach the preferred site (Site A). For this option, approximately 63 ha (155 acres) of desert shrub/grass vegetation would remain cleared for the life of the PFSF, and the remaining cleared area [251 ha (621 acres)] would be replanted with primarily native vegetation following construction.

Thus, the total land cleared for the project as proposed, including the Skunk Ridge rail corridor to Site A, would be 408 ha (1,008 acres), less than 0.4 percent of the land area of Skull Valley. Of the area cleared, only 120 ha (295 acres), about 0.1 percent of the land area of Skull Valley, would remain cleared for the life of the project; the rest would be revegetated with native plants or, in the fire barrier area, planted with crested wheatgrass. The maximum area affected by the project under this alternative would be about 730 ha (1,800 acres) for the OCA, the access road, and the area cleared for the rail corridor. This amounts to less than 0.7 percent of the area of Skull Valley.

Past activities have had a large impact on native vegetation in Skull Valley. The valley consists of approximately 108,400 ha (271,000 acres) of primarily undeveloped, but relatively disturbed land (see Section 3.4.). Little definitive information is available on its original vegetation. Historical ecological studies, based primarily on anecdotal accounts of early travelers, settlers, and explorers, have shown, however, that marked changes have occurred in the native vegetation of Utah valleys since settlement (Christensen and Hutchinson 1965). Significant vegetation changes occurred from 1859 to 1961 in the Cedar, Rush, and Skull valleys of the Bonneville Basin of Utah (Cottam 1961a and 1961b, as cited in Christensen and Hutchinson 1965). Within twenty years of settlement the original desert grasses had been largely replaced by shrubs such as big sagebrush and shadscale. Following those initial changes, junipers began invading those shrub communities. Today, except for vast areas dominated by the recently introduced annual cheatgrass, grass is rarely conspicuous as a dominant in any of these habitats. Much of the original change in vegetation from grass to shrubs is attributed to overgrazing (Christensen and Hutchinson 1965). Wildfires in conjunction with unrestricted livestock grazing were likely required for the conversion of areas to dominance by weedy annuals like cheatgrass (BLM 1988a, 1988b, 1990; Sparks et al. 1990).

The native vegetation in Skull Valley has already been substantially altered by past actions; hence, significant cumulative impacts on native vegetation have already occurred. However, the proposed project would provide only a small, incremental contribution to the existing impacts on native vegetation resulting from the historical impacts of overgrazing and wildfires. In addition, by incorporating measures to revegetate some disturbed construction areas with native species, the proposed project would minimize the overall impact to vegetation in Skull Valley and would provide a small positive benefit.

Wildlife. The maximum area affected by the project could be about 730 ha (1,800 acres). While the construction of the rail line and the fencing of the proposed PFSF could contribute to habitat (or ecosystem) fragmentation, the impacts are expected to be small because (1) the loss of habitat represents less than 0.6 percent of the habitat available in Skull Valley, (2) no wildlife species exclusively use only one portion of Skull Valley, and (3) there are no distinct migration or seasonal use patterns for the wildlife in Skull Valley. With no new developments planned for the foreseeable future in Skull Valley, cumulative impacts to wildlife are expected to be small.

Perennial/ephemeral streams and aquatic resources. Because there are only a few existing facilities in Skull Valley and there are no other major facilities planned, cumulative impacts on aquatic resources would be limited to those identified for this proposed action, which are small.

Wetlands. In general, wetlands in Tooele County are in poor condition because of heavy use by livestock, wildlife, and recreationists (BLM 1983). In order to improve the condition of wetlands in northern Skull Valley, BLM prepared the Horseshoe Springs HMP (BLM 1992a). Implementation of this HMP is protecting wetlands and improving their condition. As the proposed action would have only a small impact on wetlands, it would not add cumulative impacts to wetlands in the valley.

Threatened, endangered, and other species of special concern. Wildfires or inadvertent trampling in Skull Valley are the future activities most likely to impact Pohl's milkvetch, the only plant of special concern in the valley (see Section 4.4.2). Pohl's milkvetch has been threatened by past wildland fires and cheatgrass expansions within the greasewood communities in Skull Valley (BLM 1998c). In particular, future human activity near Hickman Knolls (where Pohl's milkvetch has been found) or on land south of the Reservation (where Pohl's milkvetch is more common) would have the potential for small impacts (Kass 1998a) to this plant species. The potential exists for suitable habitat in Skull Valley for this species to be burned or damaged by wildfires. The loss of more of the greasewood community would reduce the moisture, shade, and shelter needed by the plants. However, if wildfires are suppressed near the proposed PFSF or along the rail line, there would be a small cumulative impact on this species.

Because the size of the proposed project is very small when compared to the size of Skull Valley, the cumulative impacts upon Federally and State-listed wildlife species are expected to be small.

6.3.5 Socioeconomics and Community Resources

There are no known or planned activities in Skull Valley that could produce additional impacts to socioeconomic and community resources near the proposed PFSF site. However, both of the local transportation routes (i.e., from Skunk Ridge and Timpie) involve rail transfer points located in areas that may be used in the future for similar expansion (e.g., for other waste management activities in Tooele County's Interstate 80 Planning District). Given that the residential and infrastructure options for employees at the proposed PFSF site are similar to those for all other activities in Tooele County (i.e., live in and commute from Rush Valley or Tooele Valley), the potential for cumulative impacts to socioeconomic and community resources does exist, although no such impacts are reasonably foreseeable at this time.

6.3.6 Cultural Resources

The construction and operation of the proposed PFSF, including transportation aspects, at Skull Valley will create a moderate impact to one resource [namely, the "Hastings Cutoff" of the California National Historic Trail (42TO709)], which is eligible for listing on the *National Register,* and only minor adverse impacts to the other seven resources, primarily due to the low number of known resources in the proposed project areas (see Sections 4.6 and 5.6). There are no other proposed actions in the area that would induce a cumulative impact on cultural resources in Skull Valley. Therefore, the staff finds that the cumulative impact to cultural resources is of small significance based on the low number of resource properties affected, and the availability of accepted mitigation measures to reduce the severity of any impact on affected resources.

6.3.7 Human Health Impacts

According to Skull Valley Band and Tooele County officials, there are no other known private or public actions under consideration in Skull Valley. Therefore, there is no potential for cumulative effects on worker or public health, beyond what has been described for the proposed action in Section 6.1.7. These impacts have been determined to be small.

Cumulative effects on members of the public due to the presence of radioactive materials in Skull Valley include the effects of the proposed PFSF, in addition to effects that result from other known sources of radiation and pollution in the region. There are no foreseeable projects that would add substantially to the radiation environment in Skull Valley.

The nearest resident is about 3.2 km (2 miles) distant from the proposed PFSF and could receive a maximum annual dose of 0.000356 mSv (0.0356 mrem). This is about 0.01 percent of the radiation dose due to natural background radiation in the United States (see Table 3.18). Such small radiation doses can be received just by traveling from sea level to a few hundred feet of elevation, by moving to a different part of the United States, or by choosing one building material over another (such as stone vs. wood) (NCRP 1987b). In other words, a dose of 0.000356 mSv/yr (0.0356 mrem/yr) is well below the variability associated with the natural radiation environment in which humans live.

The cumulative risk to the population of Salt Lake County from radiation exposure to the proposed SNF shipments, when added to the exposure from other shipments of radioactive material, can be determined as follows. As reported in Section 5.7.2.8, the risk of latent cancer fatalities for SNF shipments through Salt Lake County (along the route from Green River, Utah; i.e., the route with the highest LCF risk) to the proposed PFSF would be no greater than 0.00031 per year. The Envirocare Facility west of Skull Valley accepts low-level radioactive wastes for disposal. Some of this radioactive material may pass through Salt Lake County, contributing to radiation exposures and cancer risks to county residents. In addition, some radioactive materials may pass through Utah on the way to disposal at DOE's Nevada Test Site or elsewhere. The NRC staff has adopted health risk estimates from a recent EIS (NRC 1996; NUREG-1437, Addendum 1) as a bounding estimate of the other sources of radiation exposure that may contribute to cumulative health impacts. Addendum 1 reports a combined cancer risk estimate of 13 LCFs resulting from over 350,000 radioactive waste shipments through Clark County, Nevada, over a 40-year period (that is, about 0.33 LCF/yr). As explained in

Addendum 1, the number of shipments is substantially overestimated for Clark County and would be an extreme overestimate for Salt Lake County. However, if one adds the Addendum 1 estimate of 0.33 LCF/yr to the LCF reported in Section 5.7.2.8 (i.e., 0.00031 per year), the resulting cumulative risk would be 0.33031 LCF/year. This number represents less than one additional latent cancer fatality among the exposed population (which, according to national statistics, already experiences about 2,224 cancer deaths for every 10,000 population). Consequently, the NRC staff concludes that the cumulative health effects of SNF and other radioactive waste transport on the population of Utah is small.

6.3.8 Other Impacts

Noise. Noise does not add linearly; rather, cumulative effects would be dominated by the loudest audible source. Noise impacts during construction and operation of the proposed PFSF and new rail line have already been evaluated in the earlier discussion of impacts in Sections 4.8 and 5.8. Moderate temporary impacts would result from the substantial increase in road traffic along Skull Valley Road, particularly during the first phase of construction. Other noise impacts are likely to be small.

Scenic qualities. Construction and operation of the proposed PFSF at Site A combined with construction and operation of the rail line and siding would change the scenic quality of Skull Valley by introducing an industrial presence into a largely undeveloped landscape. The staff concludes that the combined visual impact would be moderate because the visual presence of the proposed facilities would alter noticeably the scenic qualities of Skull Valley as viewed from recreational areas, residential areas, Skull Valley Road, and Interstate 80 (see Section 6.1.8.2).

In addition to this alternative, other past, present and reasonably foreseeable actions have and will continue to affect scenic quality in Skull Valley. Other past and present actions include residential, commercial, and ranch development in and around the Reservation, construction and use of Skull Valley Road and the power distribution line along the road, construction and use of Interstate 80, and construction and operation of other industrial facilities (such as the MAGCorp plant near Rowley, Utah) that are visible from Interstate 80.

The NRC staff estimates the magnitude of existing visual impacts from these past and present actions to be moderate because they have altered noticeably the scenic qualities of Skull Valley and the surrounding area. The staff is not aware of any other future actions that would contribute to cumulative impacts to visual resources.

Together, the impacts of the proposed action and the impacts of these other past and present actions would continue to change the scenic quality of Skull Valley from an undeveloped rural area into an area with residential, commercial, transportation, and industrial developments. The staff concludes that these changes would represent a moderate cumulative impact because they would combine to alter noticeably the scenic qualities of Skull Valley and the surrounding area.

Recreation. There are no known or planned activities in Skull Valley that could produce adverse impacts to recreational resources and opportunities near the proposed PFSF site. The BLM is currently reviewing lands it administers near the Cedar Mountains WSA for wilderness characteristics (see Section 3.8.3); and it is unknown if these additional lands with wilderness characteristics would be incorporated into the WSA. Any future determination on the inclusion of those areas to the Cedar Mountains WSA would likely have beneficial impacts to non-motorized recreation. If BLM does expand the Cedar Mountains WSA to include these properties, the cumulative effect would likely improve, rather than impair, non-motorized recreational opportunities on the west side of Skull Valley, but could produce a negative impact for motorized recreation.

6.3.9 Environmental Justice

A potential consideration under environmental justice is the possibility that, while the environmental impact of a facility is not large, the impact on a minority or low-income community is disproportionately adverse because the group: (1) is being currently affected by other facilities or environmental problems that leave them disproportionately vulnerable to adverse environmental effects of the facility in question; (2) has been disproportionately affected by past projects or environmental practices, leaving them more vulnerable now; or (3) has language barriers, geographical immobility, or inherently poorer access to health care or other response mechanisms than the majority population, again leaving them more vulnerable to any environmental or socioeconomic impact. In this case, the expected radiological and non-radiological health impact from operation of proposed PFSF is small for the general public for either normal operations or credible accidents; thus, the enhanced vulnerability concern does not apply because very little risk is added by the proposed PFSF facility.

Physicians in Tooele are under contract to the Indian Health Service to provide first-tier medical services to the Skull Valley Band, but inquiries to the Indian Health Service produced no data on the Skull Valley Band. Inquiries by the NRC staff and PFS to the Utah Department of Health also did not produce any data that identified any specific health problems in the Skull Valley Band. It was not possible to identify any unusual incidences of diseases in Tooele County, the smallest area for which published health information is available. While the incidence of chronic diseases is slightly higher in Tooele County than in Utah as a whole, it is not clear that the difference is statistically significant, nor is the income and ethnicity of individuals with chronic diseases available. While sufficient data do not exist that show any unique health conditions among the Skull Valley Band, there is also no evidence that the proposed PFSF would compound any health problems of nearby residents or visitors in the Skull Valley vicinity.

Summary. Examination of the various environmental pathways by which low-income and minority populations could be disproportionately affected reveals no disproportionate high and adverse impacts from construction or normal operations. There are also no credible accident scenarios by which such impacts could take place. Thus, the cumulative effect of the proposed PFSF and other activities on environmental justice concerns through direct environmental pathways is small. When considering past, present, and foreseeable future actions, the impacts from the proposed PFSF would add little to the indirect impacts and cumulative impacts and are considered to be small.

6.4 Unavoidable Adverse Environmental Impacts

There are certain limited potentially unavoidable adverse impacts associated with the construction and operation of the proposed PFSF, as well as with the transportation of SNF. Such impacts are discussed in this section.

6.4.1 Geology, Minerals, and Soils

Unavoidable soil erosion from both wind and water will occur during construction activities. Dust control and stormwater control measures, as well as revegetation of disturbed areas, will minimize soil erosion. With these mitigations, the resulting levels of soil erosion by wind and water should be similar to the levels that currently exist in Skull Valley.

Disturbing the existing soil profile and using aggregate (e.g., crushed stone) in construction are unavoidable adverse impacts of the proposed action. However, only a very small amount of soil is permanently lost in project construction, and aggregate materials could be recovered after decommissioning. Economic mineral resources located beneath the proposed PFSF and the new rail line would be unavailable for exploitation during the life of the project. These impacts, however, would be small.

6.4.2 Water Resources

Unavoidable impacts to surface water may be related to increased stormwater runoff from the areas of the proposed PFSF due to the presence of impervious surfaces (i.e., buildings, asphalt, concrete). Such runoff would be controlled under general permits (see Sections 1.6.2.1 and 1.6.2.3). Also, the possible presence of motor oils and greases from construction or operations equipment could result in a degraded quality of this runoff compared to what exists now.

No unavoidable adverse impacts on groundwater are expected as a result of construction or operation of the proposed disposal facility, because of the relatively small quantities of water to be used from newly drilled on-site wells. Withdrawal of water from these new wells is not expected to impact other users of groundwater in Skull Valley.

6.4.3 Air Quality

Unavoidable impacts to air quality from construction of the proposed PFSF would be associated with earth-moving activities that create airborne dust. Through the use of adequate control measures, such as treating disturbed areas with water or chemical surfactants for dust suppression, the potential impacts to air quality due to suspended particulate matter would be minimized. The impact on regional air quality is expected to be small.

6.4.4 Ecological Resources

The project as proposed would require the commitment of 57 ha (140 acres) for the main facility and 63 ha (155 acres) for a new rail line for a total of about 120 ha (295 acres) for the life of the facility (i.e., up to 40 years). The loss of wildlife habitat in these areas would be unavoidable. In areas lost for the life of the project, the existing vegetation, with the exception of invasive annuals such as cheatgrass, would not be restored unless revegetation is undertaken as part of non-radiological decommissioning and closure of the PFSF as required by the lease. Plant species composition and diversity would be altered because of this disruption of the natural vegetation and subsequent revegetation. Although the removal of habitat would be temporary, the natural diversity of plant species may not recover. If revegetation is to be part of non-radiological decommissioning and closure, a plan, similar to those described in Sections 4.4 and 5.4, would need to be developed consistent with the then-latest guidance.

Currently, this land is sparsely vegetated and supports low numbers of wildlife. Small amounts of animal habitat would be unavoidably lost in the disturbed areas during construction activities. It is likely that individual animals of less mobile species would be lost during construction.

Areas that are to be fenced, including the 40-ha (99-acre) restricted-access area, would be unavoidably lost for use by certain wildlife species such as mule deer and pronghorn antelope for as long as the fences are up. These impacts are expected to be small, especially considering the other available land areas in Skull Valley that are comparable to the potentially affected area.

6.4.5 Socioeconomic and Community Resources

Because of the size of the regional employment force and the relatively small number of workers to be employed on the proposed project, no adverse socioeconomic impacts are expected from the project. Likewise, there should be no adverse impacts to the local infrastructure, with the possible exception of traffic on Skull Valley Road. Increased traffic would accompany construction and operation of the proposed PFSF.

Construction and operation of the proposed PFSF should have no adverse impact on the use of off-site land near the site on the Reservation. However, construction of a new rail line from Skunk Ridge would impact the land use of the proposed right-of-way corridor, including grazing areas, until such time as the rail line were removed and the land revegetated.

6.4.6 Cultural Resources

Based on available data, construction and operation of the proposed PFSF on the Reservation would have no adverse impact on historic properties. In the unlikely event that buried cultural resource sites or artifacts are encountered during construction activities, the significance and potential for adverse impacts would be evaluated at that time.

Based on cultural resources field inventories (see Section 3.6) of all proposed project areas in Skull Valley, and subsequent *National Register* evaluations and agency consultations, the Cooperating 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* (see Section 5.6.1.1). These include historic properties 42TO709 (discussed in greater detail in the next paragraph), 42TO1409, 42TO1410, 42TO1411, 42TO1412, 42TO1413, 42TO1416, and 42TO1417, as identified in the cultural resources Class II (intensive field survey) studies (Birnie and Newsome 2000). 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 loss of integrity to the portions of the properties being preserved outside the rail corridor, including the Hastings Cutoff.

The Hastings Cutoff Trail (42TO7909) would be directly affected because the trail transects the proposed rail corridor (see Figure 1.2). Thus, a short segment of the trail that currently retains a high degree of physical integrity would be destroyed. In addition to the impact to the physical integrity of the trail, the presence of the rail line itself would be an intrusion on the place and setting of the historic trail in an area that still evokes an impression of the original cultural landscape of this western migration route. Mitigation measures have been identified in the Memorandum of Agreement developed as part of the consultation process under Section 106 of the NHPA (see Section 9.4.2) that would ameliorate these impacts.

6.4.7 Human Health Impacts

The impacts of radiation emitted from SNF casks during transport to or storage at the proposed PFSF cannot be avoided. However, the radiation doses that would occur as a result of the proposed action are well below NRC regulatory limits and represent a small fraction of the existing background levels of radiation, and the radiological health risk is considered to be small.

6.4.8 Other Impacts

6.4.8.1 Noise

Increased noise will accompany construction and operation of the proposed PFSF; however, the anticipated noise levels will not create adverse impacts. Increased traffic on Skull Valley Road due to workers at the facility, as well as noise from the train(s) moving SNF to the proposed PFSF from the new Skunk Ridge siding, would generate additional noise. The increased noise would be audible to residents along Skull Valley Road.

6.4.8.2 Scenic Qualities

Because the proposed PFSF differs from the rural and undeveloped nature of the surrounding landscape, visual impacts to the scenic qualities of Skull Valley would be unavoidable during construction and operation. After the SNF has been removed to a permanent repository, the impacts to the scenic qualities of Skull Valley could be eliminated by removing all facilities and recontouring the landscape to its original condition.

6.4.8.3 Recreation

There should be no unavoidable adverse impacts to recreation associated with the construction and operation of the proposed project at the proposed site. Construction and operation of the proposed rail line from Skunk Ridge to the proposed site may have some limited adverse impacts to certain recreational values found on the BLM-administered land (e.g., solitude and some OHV activities) but would not adversely affect others (e.g., camping and bird watching). In addition, although the proposed rail line right-of-way does not cross any of the land parcels recently reinventoried for wilderness characteristics, construction and operation of the proposed rail line could change recreational opportunities on adjacent and nearby public lands.

6.4.9 Environmental Justice

The principal unavoidable impact could come through the loss of any species and habitat that may be of subsistence or cultural importance to Native Americans. Depending on what species are affected, this could be of some significance to some of the more traditional Skull Valley Band members. However, the species and habitat found on the site and in the rail corridor have not been identified as unique; therefore, the impact would be small.

6.5 Relationship Between Short-Term Uses of the Environment and Long-Term Productivity

Short-term uses of the environment for the proposed project include (1) using a portion of the Reservation for the interim storage of SNF, (2) using a portion of the land in Skull Valley for a new rail line, and (3) obtaining railbed ballast and construction aggregate from local quarries. These short-term uses of the environment would provide an option for SNF storage to help ensure the continued operation of existing U.S. nuclear power plants.

The proposed action would produce favorable short-term effects on the local economy, including that of the Skull Valley Band. Under the proposed action, economic productivity of the land on the Reservation would be enhanced far above its current use and economic value.

The land in Skull Valley that would be occupied by the proposed project is presently undeveloped rangeland. A limited amount of grazing currently occurs on this land, and the land to be used by the proposed PFSF and the new rail line does not have any other current agricultural or productive uses. The use of this rangeland for the proposed project would reduce the amount of such land available in Skull Valley, but the reduction would not be a significant amount. The proposed project would replace this rangeland with an industrial development which has its own infrastructure in the form of a new rail line. The addition of such infrastructure to Skull Valley would increase the productivity and usefulness of the land far above its current use for limited cattle grazing and could potentially increase the opportunities for further economic development for the Skull Valley Band and/or other unused portions of Skull Valley.

The proposed PFSF is an interim facility and would not be a permanent addition to Skull Valley. Before termination of the lease and NRC license, the PFSF would be decommissioned, and the property could be reused for other purposes. Likewise, the new rail line could either be removed or reused for other purposes. Therefore, there would be no long-term commitment of the proposed project areas in Skull Valley, and there would be no impairment to the long-term productivity of these areas.

Any increases in noise, road traffic, water use, suspended particulates, and radiation doses associated with construction, operation, and closure of the proposed PFSF would cease upon termination of the license for the facility.

6.6 Irreversible and Irretrievable Commitment of Resources

The land upon which the proposed PFSF, the new access road, and the new rail line (or new ITF) would be constructed would be lost to other uses until completion of decommissioning of the facility and the license is terminated. The commitment of lands involves the loss of plant and animal resources, as well as habitats that currently exist, or that could exist, on those lands. In addition, certain wildlife species may not be able to use areas to be fenced as part of the project.

Approximately 94 ha (232 acres) of vegetation and wildlife habitat on the Reservation would be cleared for the life of the proposed project. An additional amount of land [up to 63 ha (155 acres) more] could be cleared of vegetation for the life of the project to accommodate a new rail siding and new rail transportation corridor from Skunk Ridge to the proposed site of the facility. The affected areas could be revegetated and returned to current use by wildlife after the license for the facility is terminated.

Construction and operation activities would consume materials that may not be recyclable or recoverable. The portion of excavated soil used to create soil cement would be irretrievably lost. Construction, operation, and closure of the site would require a commitment of human and financial resources. Commitments of machinery, vehicles, and fossil fuels would also be required during the project; however, none of the aforementioned resources are in short supply in the vicinity of the proposed project.

Water would be consumed for dust suppression during construction and during the on-site manufacture of the concrete storage pads and casks. Water used during the project (except for water chemically bound in the manufacture of concrete) would eventually recycle to the atmosphere for distribution elsewhere. Water obtained from aquifers would eventually be replaced by natural recharge processes.

No known commercially valuable mineral resources are expected to be affected by the project, although access to any such resources that may exist beneath the site of the proposed PFSF and the proposed Skunk Ridge transportation corridor would be precluded until the facility is decommissioned before the license is terminated.

6.7 Potential Impacts of the No-Action Alternative

According to PFS's ER (PFS/ER 2001), not building the proposed PFSF could have the following consequences:

- increased probability of shutdown of operating reactors before operating license expiration due to the lack of adequate SNF storage capacity, with the attendant loss of electrical power generation for that area or region,
- delays in reactor decommissioning activities due to the inability to remove SNF from sites in a timely manner, resulting in continued expenditures associated with SNF storage at permanently shutdown reactors,
- the need to construct additional at-reactor ISFSIs to handle the anticipated need for SNF storage.

The no-action alternative is included in this FEIS to provide a baseline for comparison with the proposed action. Under the no-action alternative, no PFSF and no transportation facilities would be constructed in Skull Valley. The impacts described in Chapters 4 and 5 of this FEIS would not occur, and Skull Valley would remain as it is today (see Chapter 3). No lease payments would accrue to the Skull Valley Band, and the Band's economic situation would likewise continue as it is today. In addition, the economic benefits to the state of Utah and Tooele County under Alternatives 1-4 would not occur under the No-Action Alternative.

While the no-action alternative would avoid any impacts on Skull Valley due to the construction and operation of the PFSF and related transportation facilities, it could lead to impacts at other locations. If the proposed PFSF is not built in Skull Valley, SNF would continue to accumulate at nuclear power plants. Based on current DOE plans, removal of SNF from nuclear power plant sites would not begin until 2010 at the earliest, when DOE anticipates that a permanent geological repository will be ready to begin receiving SNF. Most SNF is currently being stored in SNF pools that were built along with the reactor systems. Some power reactor licensees have expanded their pool storage capacity to accommodate the accumulated SNF. A few have built at-reactor ISFSIs to store their SNF in dry casks using a technology similar to what is proposed for Skull Valley (see Figure 1.5). Licensees that cannot expand their SNF storage capacity at their sites may have to terminate operations when their available SNF storage capacity is filled.

As described in Section 2.2.5, the no-action alternative would allow for only two options in regard to the continued storage of SNF: (1) either the capacity of at-reactor SNF storage facilities would have to be expanded or new at-reactor SNF storage facilities would have to be constructed or (2) the operating reactors would have to shut down when their existing storage capacity is reached. The potential environmental impacts of the first of these two options are examined in this section. While the Cooperating Agencies recognize that many environmental impacts could result from shutting down nuclear power reactors, a full evaluation of these potential environmental impacts (such as reduced power availability or the generation of additional air pollution from replacement sources of electricity) is beyond the scope of this FEIS. The local and regional impacts resulting from the loss of electric generating capacity for shutdown reactors, including the potential for increased electricity prices, are speculative and are not addressed in detail in this FEIS.

The NRC has examined, in support of other agency actions, the environmental impacts of at-reactor ISFSIs. In support of its Waste Confidence Decision, NRC examined the environmental impacts of the operation of ISFSIs built at operating nuclear power plant sites. The Commission has made a general 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 life for operation of that reactor at on-site or off-site ISFSIs (see 10 CFR 51.23; and 49 Fed. Reg. 34688, Aug. 31, 1984). The NRC has reviewed the Waste Confidence Decision twice [i.e., in 1990 (55 Fed. Reg. 38474, Sept. 18, 1990) and in 1999 (64 Fed. Reg. 68005, Dec. 6, 1999)] since it was first issued, 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. 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 which tiered from the “Final Generic Environmental Impact Statement on the Handling and Storage of Spent Light Water Reactor Fuel,” NUREG-0575, August 1979, and the “Environmental Assessment for 10 CFR Part 72 ‘Requirements for the Independent Storage of Spent Fuel and High-Level Radioactive Waste,’” NUREG-1092, August 1984. The accompanying 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.

Eleven existing at-reactor ISFSIs with specific licenses issued by NRC were previously identified in Chapter 1 (see Figure 1.5). For each of the 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 NRC 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, as a general matter, based on the previous NRC studies discussed above, that the construction and operation of future at-reactor ISFSIs would result in significant environmental impacts. No further site-specific studies or evaluations have been undertaken in this FEIS in regard to the provision of additional at-reactor storage.

The following discussion includes impact assessments for future at-reactor ISFSIs prepared by the NRC staff as part of the current environmental review. Because of the large number of operating reactor sites, as well as their individual site characteristics, the discussion below is limited to broad observations about the nuclear power industry.

6.7.1 Geology, Minerals, and Soils

Because activities associated with the no-action alternative would occur at existing nuclear power reactor sites, there should be no significant impacts to geology, soils, or on-site minerals beyond the impacts already discussed in existing NEPA documentation for those sites.

The construction or expansion of at-reactor storage facilities would involve the use of construction materials, such as sand, aggregate, and gravel. These resources are generally not in short supply in the United States, and any impacts from their use is expected to be small.

6.7.2 Water Resources

Potential impacts to surface water and groundwater from the no-action alternative could arise from the increased use of these resources during construction and operation of new or expanded at-reactor storage facilities. These impacts are expected to be small based on the previous and current use of such resources for power reactor operations (i.e., considering existing reactor cooling and wet pool storage requirements) and existing on-site storage activities.

6.7.3 Air Quality

For construction activities related to the expansion or construction of new SNF storage at existing reactor sites, there could be air quality impacts associated with site preparation and earth-moving activities. These impacts at an individual reactor site would likely be less than the impacts for the proposed project in Skull Valley because the amount of at-reactor land to be disturbed should be smaller than the 40 ha (99 acres) proposed for the PFSF or the additional land required for the transportation facilities related to the PFSF; and, consequently, less suspended dust would be generated. However, if the distance to the nearest downwind site boundary and/or to the nearest resident for the new at-reactor storage facilities were less than the distances for the proposed site in Skull Valley, then any reduction in impacts as a result of generating a smaller amount of fugitive dust emissions could potentially be offset by higher airborne concentrations that would be associated with the shorter distances.

6.7.4 Ecological Resources

Potential impacts on ecological resources from the expansion or creation of at-reactor SNF storage facilities could arise from activities associated with disturbance of existing plant and animal habitats. Where storage would be expanded only within the owner-controlled area of existing reactor sites, impacts would most likely be small because of the existing industrial characteristics of these areas. If new SNF storage facilities were developed in the vicinity of existing storage structures and minimal surface clearing were required, impacts to native vegetation, wildlife, wetlands, or species of special concern would be expected to be small.

6.7.5 Socioeconomic and Community Resources

For expansion or construction of new SNF storage facilities at existing reactors, there could be some socioeconomic impacts associated with the size of the workforce, land-use, and local traffic near existing nuclear plants. The potential effects would depend on the site and the type of expansion. Because the amount of additional SNF storage needed at any one reactor would be far less than the 40,000 MTU proposed for Skull Valley, the potential reactor-specific impacts should be smaller than those identified for Skull Valley.

Land use impacts could arise at those existing reactor sites where grazing, recreational activities, and other public access activities occur within the boundaries of the owner-controlled area. Where such activities occur, and where these same areas might be used for the expanded or newly constructed storage facilities, some adverse impacts could occur, but are not expected to be significant.

6.7.6 Cultural Resources

Expansion of SNF storage capacity at existing nuclear reactor sites could have some potential for impacts to cultural resources, if construction activities occur on previously undisturbed acreage at those facilities, but are not expected to be significant.

6.7.7 Human Health Impacts

Both public and occupational doses are associated with routine operations (including SNF storage) at a typical operating nuclear facility. Additional on-site storage of SNF would add a small incremental amount to the existing doses. Incremental increases in doses to workers would be monitored and would be administratively controlled so as not to exceed regulatory limits. Because the combined doses would still comply with NRC regulatory limits, there would be no significant impact to workers or members of the public from the storage of additional fuel.

6.7.8 Other Impacts

6.7.8.1 Noise

Noise would accompany any expansion or new construction of at-reactor SNF storage facilities. The magnitude and extent of noise impacts would be highly site-specific. In general, construction and operation of an at-reactor ISFSI would have noise impacts similar to those from the operational activities at the reactor itself, although they would be limited at any particular reactor site in comparison to the noise associated with PFSF construction and operation. Hence, any incremental noise impacts would be expected to be small.

6.7.8.2 Scenic Qualities

Creation or expansion of at-reactor SNF storage facilities could cause changes in the visual features of the reactor site. If the new storage facilities were built adjacent to the much larger nuclear reactor facilities, the visual effects would be insignificant because they would not be readily apparent or distinguishable to viewers of the reactor site.

6.7.8.3 Recreation

As discussed in Section 4.2.5, there may be reactor sites where recreational activities occur within the OCA. Where such activities occur, and where these same areas might be used for the expanded or newly constructed storage facilities, some adverse impacts to recreation could occur, but are not expected to be significant.

6.7.9 Environmental Justice

The potential impacts under the no-action alternative would result from the options of expanding SNF storage capability at existing nuclear reactor sites. In the event that new on-site storage facilities are constructed, such construction and operations would occur within the boundaries of the existing power plants. Because these construction activities are expected generally to result in small impacts to the environment, as set forth above, there should be no disproportionately high and adverse impacts to minority and low-income populations and therefore no environmental justice concern. The additional, incremental radiation that would emanate into the environment from these new storage facilities would comply with NRC dose limits, so no significant offsite impacts and no environmental justice concerns would be expected from radiation.

6.7.10 Economic Costs of No Action

As a consequence of continued generation of SNF and the need to store SNF at reactor sites until a permanent repository can accept it, the no-action alternative would likely result in increased at-reactor SNF storage costs. These costs include capital costs for constructing at-reactor ISFSI's, operating costs for at-reactor ISFSI's, and costs for operating cooling pools which would need to be in service for longer time periods if no action was taken (i.e., maintaining the current spent fuel storage methods, if the proposed PFSF was not available). The increased costs would vary over time and by reactor site depending on site-specific factors including available space and cost. The following per unit costs (see Table 8.1) are considered typical of at-reactor storage for the no-action alternative:

- $8,000,000—annual spent fuel storage pool operating cost
- $600,000—annual cost to operate an at-reactor ISFSI at a site that also has a spent fuel storage pool
- $9,184,000—upfront capital cost of an at-reactor ISFSI (if the reactor site does not already have an ISFSI)
- $8,084,620—upfront capital costs if the reactor site requires a dry transfer system
- $93,737 to $152,596—range of incremental costs per metric ton for dual purpose canister systems required for at-reactor ISFSI SNF storage

The no-action alternative would not change at-reactor costs for sites that would not have utilized the PFSF. Chapter 8 provides a detailed account of how at-reactor costs would tend to vary between no-action and the proposed action.

7. EVALUATION OF AN ALTERNATIVE SITE IN WYOMING

Consistent with the requirements of NEPA, this FEIS compares the impacts of the proposed action to the impacts of alternatives. One alternative is locating the proposed PFSF some place other than the Reservation of the Skull Valley Band of Goshute Indians. As an independent regulatory agency, the NRC does not select sites or participate with an applicant in selecting proposed sites. The NRC does not have the authority to require an applicant to submit a totally different proposal, such as building on a different site. Rather, the NRC may make one of three determinations on an application for a proposed action, namely, the NRC may: (a) grant the application (i.e., authorize the proposed action), (b) grant the application subject to certain conditions, or (c) deny the application. However, because many environmental impacts can be avoided or significantly reduced through proper site selection, the NRC examines the applicant's site selection process to ensure that adequate consideration is given to alternative sites. NRC guidance for environmental reviews for power reactors does not apply to the review of an ISFSI. For evaluating alternative sites, that guidance specifies that the applicant submit a slate of alternatives, and the NRC compares the proposed site to the alternatives to determine if an obviously superior alternative site has been identified (see 49 Fed. Reg. 9352, 9354, March 12, 1984). While not directly applicable to the requested action, the guidance has informed the staff's review of alternatives to the site on the Reservation proposed for the PFSF. Accordingly, the NRC staff, as set forth below, has evaluated the proposed site to determine if an obviously superior site has been identified.

The proposed action under consideration in this FEIS (see Sections 1.2 and 1.5) applies to Site A at the Skull Valley location. As discussed in Section 2.2.3.1, PFS's site selection process identified a site in Fremont County, Wyoming, as a candidate site for the proposed PFSF. While the Wyoming site is not being actively considered by PFS for the siting of an SNF storage facility, it is nevertheless appropriate for use in this FEIS for comparison purposes. The Wyoming site was evaluated by the NRC staff to determine if it is obviously superior to the Skull Valley site selected by PFS (i.e., Site A). In this chapter, the potential environmental impacts of constructing and operating the proposed PFSF at the Wyoming site are compared to those of the Skull Valley site. While the level of information on the Wyoming site is less detailed than that for the Skull Valley site, it is sufficient to reasonably characterize how the impacts from the proposed PFSF would likely differ if it were sited in Wyoming instead of Skull Valley. The comparative analysis is also intended to assist in more accurately gauging the extent, magnitude or degree of any potential environmental impacts that may be associated with the Skull Valley location.

7.1 Site Selection Process

From April through June 1996, PFS began the process for selecting a site for an ISFSI. Initially, PFS began evaluating 38 separate potential sites (see Table 7.1). Twenty-six of these sites, including the Skull Valley site, were derived from the Nuclear Waste Negotiator's (NWN) list of sites identified by those jurisdictions that had expressed an interest in hosting a Federal monitored retrievable storage (MRS) facility. Some of the jurisdictions controlling these sites also expressed an interest in hosting the PFSF. The other 12 sites were identified from entities that contacted PFS and requested that each of those sites be considered as a possible site. The four phases of the process for evaluating the candidate sites are described in PFS's ER (see Chapter 8 in PFS/ER 2001) and are summarized below.

Table 7.1. Potential host sites considered for the proposed PFSF

No.	Potential host site	No.	Potential host site
01	Mescalero Reservation (Lower Three Rivers Site); New Mexico	20	Northern Arapaho; Wyoming
02	Mescalero Reservation (Ranch House Site); New Mexico	21	Ponca Tribe; Oklahoma
03	Goshute Tribe; Skull Valley, Utah	22	Prairie Island Sioux; Minnesota
04	Santee Sioux; Knox County, Nebraska	23	Sac & Fox Nation; Oklahoma
05	Absentee Shawnee; Oklahoma	24	San Juan County; Utah
06	Akhoik Kaguyak Tribe; Alaska	25	Tetlin Indian Reservation; Tetlin, Alaska
07	Alabama-Quassarte Tribe (Creek); Oklahoma	26	Tonkawa Tribe; Oklahoma
08	Apache County; Arizona	27	Ute Mountain Ute Tribe; Colorado
09	Apache Development Authority; Oklahoma	28	Yakama Indian Nation; Washington
10	NEW Corporation; Fremont County, Wyoming	29	City of Caliente & Lincoln County; Nevada
11	United Nuclear Corporation; New Mexico	30	U.S. Fuel and Security Service Group, Pacific Atoll (Palmyra Island); U.S. Protectorate
12	Caddo Tribe; Oklahoma	31	Barnwell; South Carolina
13	Chickasaw Nation; Oklahoma	32	Hanford; Richland, Washington
14	Eastern Shawnee; Oklahoma	33	Fort Wingate Army Depot; Gallup, New Mexico
15	Fifield Development Corp.; Fifield, Wisconsin	34	Atomic Energy of Canada Limited, Whiteshell Laboratories; Manitoba, Canada
16	Fort McDermitt Paiute Shoshone Tribe; Nevada	35	TGM, Inc.; White Sands, New Mexico
17	Grant County; North Dakota	36	Area 25, Nuclear Test Site; Nevada
18	Lower Brule Sioux; South Dakota	37	LADO Ranch; Texas
19	Miami Tribe; Oklahoma	38	Andrews County; Texas

Source: Table 8.1-1, PFS/ER 2001

During the first phase of PFS's site selection process, the PFS Board of Managers conducted an initial screening on all potential sites brought to their attention in order to eliminate candidate sites that were burdened by obvious disqualifying factors. These factors included:

- Willing host jurisdiction. The jurisdiction should be willing to host an ISFSI.
- Public acceptance. Local community attitudes should appear to be open to the siting of an ISFSI.
- Favorable proximity to transportation access. The proposed site should be within reasonable proximity of transportation infrastructure.
- No jurisdictional restrictions. The jurisdiction of the proposed site must have no statutes or other legal restrictions that would prohibit the siting on an ISFSI. This criterion was used as an exclusion factor.

Applying the Phase 1 criteria, PFS eliminated 20 of the 38 sites. Nine jurisdictions that originally participated in the MRS siting process had declined or did not pursue DOE's funding to continue with the MRS process so the sites under their control were eliminated from further consideration. Four other sites were also eliminated based on an unwilling jurisdiction. The controlling entity of two of these sites participated in the MRS process, but subsequent to their participation in the MRS process, indicated that they were not willing to host an SNF storage facility. The other two sites (i.e., under the control of the Mescalero Apache tribe) were eliminated from further consideration because of an unsuccessful attempt by PFS to reach agreements with the controlling entity about the siting of an ISFSI. Finally, seven sites were eliminated because DOE declined to fund further study and evaluation of them as potential MRS sites. As a result of DOE's denial of funding to these sites, PFS did not believe further evaluations of these sites were warranted.

The objective of the second phase of PFS's site-selection process was to identify sites for further in-depth study and analysis. To achieve this objective, PFS performed further screening of the potential sites in the second phase by using the following criteria:

- Site availability. The proposed site should have one or more areas of suitable size available for acquisition.
- Site development cost. The proposed site should have one or more areas that could be developed at a reasonable cost.
- Flood plains. The proposed site should have areas of suitable size located outside of flood plains [as defined in 10 CFR 72.122(b)(2)]. This criterion was used as an exclusion factor.
- Geology. The proposed site should have stable geological conditions [as defined in 10 CFR 72.102(e)]. This criterion was used as an exclusion factor.
- Seismology. The proposed site should not be within the range of strong near-field ground motion from historical earthquakes on large known capable faults [as defined in 10 CFR 72.102(e)]. This criterion was used as an exclusion factor.
- Demography. The proposed site should be in an area of low population density.
- Environmental consideration. The proposed site should have areas of suitable size that would not significantly impact threatened or endangered species, wetlands, historical or archaeological resources, or major recreational areas. This criterion was used as an exclusion factor.

As part of the second phase, the PFS Board of Managers held a meeting on May 22, 1996, to select the sites that would be recommended for the third phase of the site-selection process. At the meeting, the PFS Board members were provided with: (1) an information sheet for all 38 sites that tabulated responses to a series of questions that were based upon the Phase 1 and 2 screening criteria (see Appendix F) (information was provided for the twenty sites eliminated in Phase 1, although they were not considered in detail at the meeting), and (2) written evaluations of the sites for which the most detailed information was available, which included background information and identified the advantages and disadvantages of each site.

Although 18 of the 38 sites remained after the Phase 1 screening process, the PFS Board of Managers focused the meeting on the eight sites that were furthest along by virtue of information provided by the potential hosts. The eight sites included: (1) Santee Sioux; Knox County, Nebraska, (2) City of Caliente and Lincoln County, Nevada, (3) Goshute Tribe; Skull Valley, Utah, (4) Barnwell, South Carolina, (5) Hanford; Richland, Washington, (6) NEW Corporation; Fremont County, Wyoming, (7) U.S. Fuel and Security Services Group; Pacific Atoll (Palmyra Island), U.S. protectorate, and (8) United Nuclear Corporation; New Mexico.

Other potential sites were also discussed, but were generally deemed not to provide any greater potential for a satisfactory site than those already discussed. Thus, ten of the remaining 18 sites were eliminated. The discussion covered background information, as well as the various advantages and disadvantages of each site. The PFS Board of Managers identified four of the eight remaining sites as warranting further detailed evaluation. The four sites were: (1) City of Caliente and Lincoln County, Nevada, (2) Goshute Tribe; Skull Valley, Utah, (3) NEW Corporation; Fremont County, Wyoming, and (4) United Nuclear Corporation; New Mexico. Subsequent to the identification of these four sites, the host jurisdiction for the City of Caliente and Lincoln County, Nevada, decided not to participate in the additional studies. Thus, only three sites were left for further consideration.

The purpose of the third phase of the PFS site-selection process was to identify at least two candidate siting areas that would likely meet NRC's licensing regulations and not be unreasonably expensive to develop. The evaluation process used in this phase involved two steps. First, a "Site Selection Questionnaire," containing a list of detailed questions intended to determine the suitability of the site, was sent to the owners or promoters of the remaining three candidate sites. Second, a major engineering firm familiar with nuclear construction was engaged to conduct a field evaluation for each of the remaining three candidate sites. A set of judgment criteria (i.e., requirements, exclusion factors, avoidance factors, and preference factors) pegged to the detailed questionnaire was developed for the subsequent evaluation and selection of a final candidate site.

Responses to the site selection questionnaire were received from the controlling entity of each site by mid-June 1996 (see Appendix F). The engineering firm prepared an evaluation matrix for the three sites using the responses to the questionnaire and the field investigations. This evaluation concluded that the United Nuclear Corporation, New Mexico, site did not appear to offer sufficient contiguous land areas suitable for siting an ISFSI of the size anticipated for this project. This site was therefore eliminated from further consideration. The two remaining sites were the Skull Valley site and the New Corporation site in Fremont County, Wyoming.

In Phase 4, the remaining two sites were subjected to field investigations to further their technical and licensing viability. Three primary categories were used for the field investigations: environmental, technical, and permitting requirements. Environmental criteria included land use, demographics, cultural factors, ecological factors, hydrology, hazards, meteorological factors, visual impact, and auditory impact. Technical criteria included geologic factors, topography, drainage, siting, flexibility, cost, and accessibility. The final category included permits required for wetlands, dredge/fill operations, Endangered Species Act compliance, and building. The results of the field investigation were formally documented in a report to PFS in August 1996 (Stone & Webster 1996).

The field investigation concluded that the two remaining sites ranked very closely to each other on the overall technical evaluation criteria and that both sites were suitable for development of a SNF storage facility. The Wyoming site was found to rank slightly higher, based on the point system developed by the engineering firm. Based on the findings of the technical and environmental evaluations, the PFS Board of Managers authorized negotiations with the owners of both sites. As a result of this process, the Skull Valley site was ultimately chosen over the Wyoming site by PFS based upon (a) a more favorable lease or purchase arrangement with the land owners, (b) greater distance to population centers, (c) the promoter of the Wyoming site possessing only an option to purchase the site, (d) uncertainties associated with the required legislative approval for the Wyoming site, and (e) a favorable vote by the Skull Valley Band's tribal council to proceed with the project.

The PFS site-selection process has a rational, objective structure and appears reasonable. The approach of using the NWN sites, as well as others that expressed an interest in hosting the PFSF, as the set of sites considered also appears reasonable. Specific weighting and ranking factors were not developed by PFS Board of Managers, therefore, it is difficult to ascertain specifically how the PFS Board of Managers quantitatively evaluated and selected the four candidate sites. However, based on the information provided on these four sites, the Board of Managers did have objective information that would allow them to make a reasoned decision among the alternative sites. Once the candidate sites were selected, PFS performed site investigations and evaluated the sites using specific technical and environmental criteria. Weighting factors were used to rank the sites. The PFS site selection process, therefore, appears to be reasonable.

7.2 Characteristics of the Wyoming Site

The alternative site in Wyoming is located north of Shoshoni, Wyoming, about 39 km (24 miles) northeast of Riverton and about 16 km (10 miles) southeast of the Owl Creek Mountains (see Figures 7.1 and 7.2). It is also about 9 km (6 miles) east of the Wind River Indian Reservation. The siting area is located on privately-owned land that is currently used for the seasonal grazing of livestock. The siting area offers locations of sufficient size to support the minimum needs of the facility. A Burlington Northern Santa Fe Railway line runs adjacent to the site. The layout of the facility and its design would be similar to that described in Section 2.1.1.2 for the proposed PFSF in Skull Valley. One significant difference between the proposed site in Skull Valley and the alternative site in Wyoming is that the Wyoming site is located adjacent to an existing railroad and would require approximately 1.6 km (1 mile) of new rail construction for access.

Water well records obtained from the State of Wyoming in 1996 indicate the presence of domestic wells approximately 1,380 m (4,500 ft) southwest and 1,380 m (4,500 ft) northwest from the center of the Wyoming site. Residences exist at each of these well locations. Thus, the nearest resident(s) in Wyoming would be closer than in Skull Valley. Population characteristics in the vicinity of the Wyoming site differ from the Skull Valley site. Both the towns of Shoshoni and Bonneville are within 3.2 km (2 miles) of the Wyoming site. In 1990, the population of Shoshoni was 497. PFS estimates that the population of Bonneville is 60 (PFS/RAI2 1999).

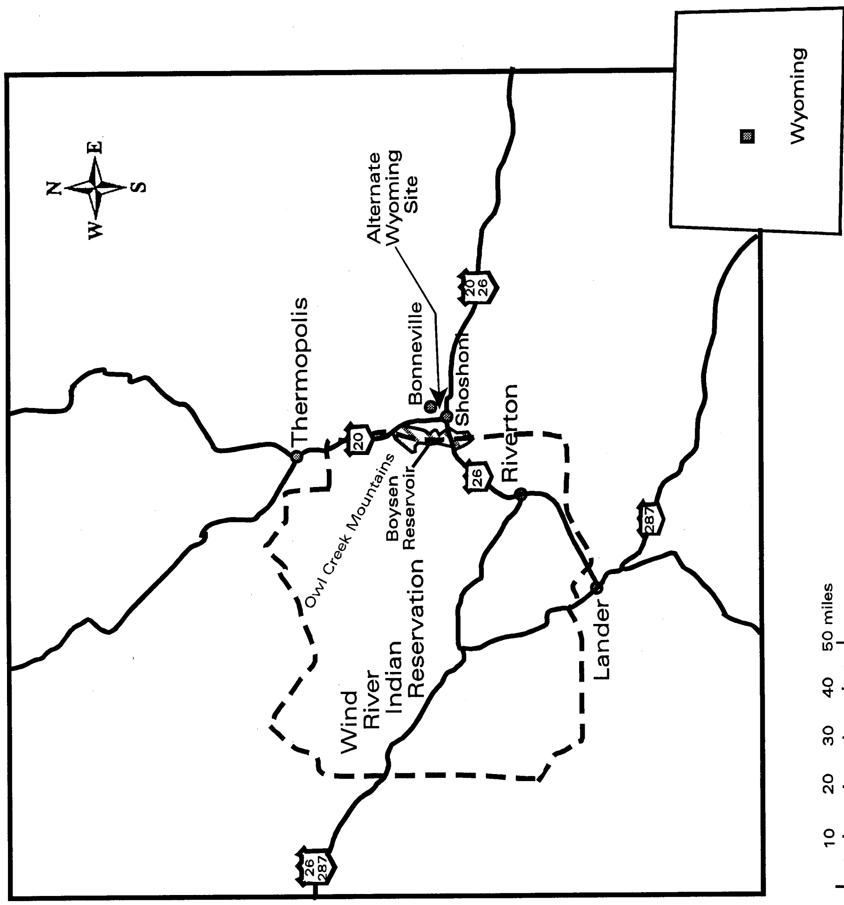

Figure 7.1. Possible location of an alternative spent fuel storage facility in Wyoming.

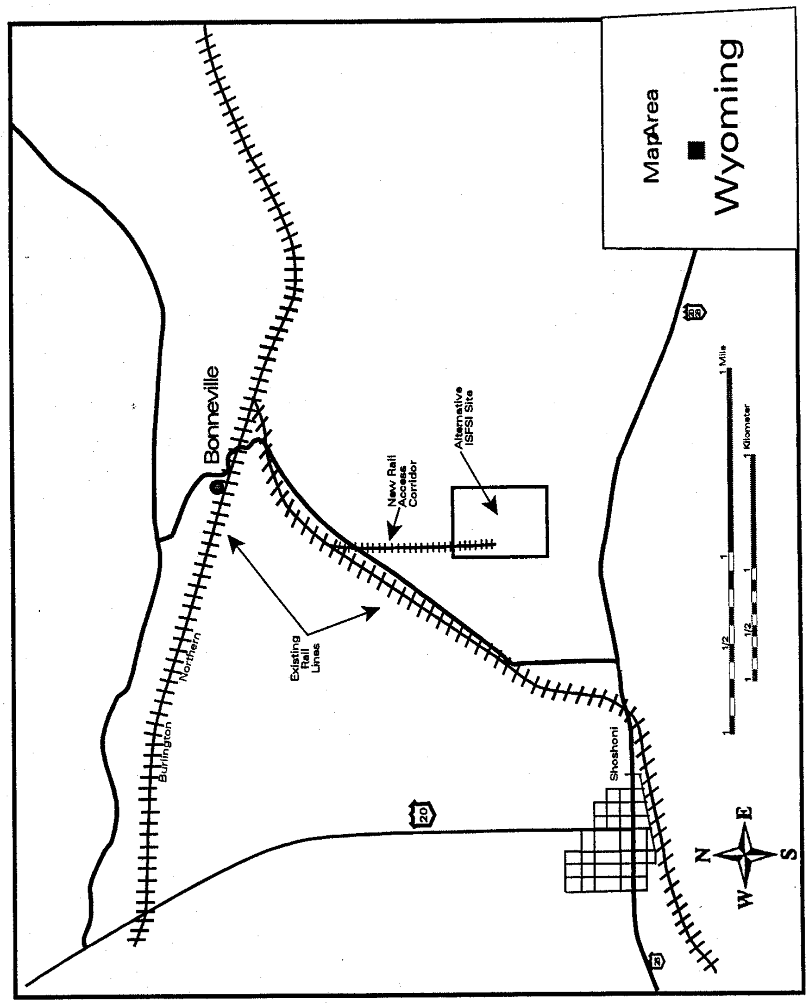

Figure 7.2. Possible site for a spent fuel storage facility near Shoshoni, Wyoming.

7.3 Impacts of Constructing and Operating an SNF Storage Facility at the Wyoming Site

As discussed in Section 2.2.3.1, PFS has identified an alternative site in Wyoming for its SNF storage facility. An evaluation of potential environmental impacts at this Wyoming location has been conducted for comparison to the impacts described in Chapter 4 for an SNF storage facility at Site A in Skull Valley, Utah. The discussions below present the relevant aspects and characteristics of the environmental setting in Wyoming in sufficient detail to provide an understanding of how construction and operation of the proposed PFSF might impact the Wyoming site as compared to its impacts at the Skull Valley site. Table 7.11, discussed further in Section 7.6, provides a resource by resource summary comparison of the impacts at the two sites.

It is not the intent of the following sections to definitively describe the magnitude, extent or degree of the potential impacts of construction and operation of an ISFSI in Wyoming. Instead, the characteristics of the Wyoming site are compared to those in Skull Valley to assist in evaluation of the impacts associated with the use of the Skull Valley site, and to reach a conclusion as to whether the Wyoming site is obviously superior to the Skull Valley site.

7.3.1 Geology, Minerals, and Soils

Like the preferred site, environmental impacts to soils at the Wyoming site include loss of the soils resource because of physical alterations to the existing soil profile. Similarly, impacts would occur to economic geologic resources (e.g., aggregate) from their use as construction materials and from possible access restrictions to minerals beneath the site. PFS has indicated that sufficient quantities of aggregate material would be available. The closest sources of aggregate would be approximately 42 to 45 km (26 to 28 miles) south of Riverton, Wyoming. Sand and gravel aggregate construction materials are readily available in Fremont County. Because mineral resources (coal) are widely available and more economically obtained elsewhere in the area, impacts from the unavailability of any coal beneath the site would be small.

USDA (1993) reports that soils at the Wyoming site are shallow [about 45 cm (18 inches)] and well drained. Hazards of water and wind erosion are severe and moderate, respectively. Use of the soils for roadfill, sand, or gravel construction materials is poor to improbable due to excess fines. Topsoil quality is poor due to the presence of small stones. The ability for water to move downward through the saturated soils is slow (0.2 to 0.6 inch/hr), and pH varies between 7.9 and 9.0. Shrink-swell potential is moderate (between 3 and 6 percent). These soil characteristics are similar to those at the preferred site in Skull Valley (see Section 3.1).

The seismic characteristics at the Wyoming site are also compared to those at the preferred site and are found to be similar. Earthquakes pose a geologic hazard at the Wyoming site as they do at the proposed Skull Valley site (see Section 3.1). Case (1999) describes the presence of the east-west trending Stagner Creek Fault system located north of the town of Shoshoni and about 13 km (8 miles) north of the Wyoming site. This fault is considered to be a capable fault as described in 10 CFR Part 100, Appendix A. The fault is considered to have the potential for causing a magnitude 6.75 earthquake, which is similar to the potential for the Stansbury Fault causing a magnitude 6.8 to 7.0 earthquake estimated for the proposed Skull Valley site (see Section 3.12). Because the earthquake magnitude for the fault system near the Wyoming site is similar to that for the faults near the Skull Valley site, the seismic characteristics of the Wyoming site are considered to be similar to the Skull

Valley site. This factor, moreover, can be addressed by appropriate facility design modifications to assure the safe construction and operation of the proposed facility.

The Wyoming site is located in the Wind River Coal Basin, which contains thin layers of sub-bituminous coal. PFS reports (PFS/RAI2 1999) that the basin is mined along its edges where the coal is at or near the ground surface, and the closest exposure of coal-bearing rocks is roughly 13 km (8 miles) north of the site. Coal may be present at some unknown depth beneath the Wyoming site, but mining of that resource is unlikely due to more economically available coal located near the surface at other locations in the region.

Oil and gas reserves are also present in the Wind River Basin. A small abandoned gas field is located about 8 km (5 miles) east of the Wyoming site, and two exploratory wildcat wells are located about 1.2 km (0.75 mile) northwest of the site. The site area is included within the productive limit of the Fort Union Formation gas play, and the potential for exploration in the future is unknown. Mineral production in the site area is limited to a small uranium prospect located about 4 km (2.5 miles) northwest of the Wyoming site and a feldspar processing plant located just north of the site, where trona is currently processed and shipped.

On balance, the Wyoming site is similar from a seismic perspective; any differences between the seismic environment in Skull Valley and the Wyoming site can be addressed in the facility's design. The potential loss of mineral resources during construction and operation of an ISFSI is greater than that at the Skull Valley site.

7.3.2 Water Resources

Surface water. The Wyoming site is in the central part of the State where annual precipitation is approximately 25 cm (10 inches). The site lies on upland terrain between two ephemeral stream valleys. No perennial surface water features exist on site, and area drainage is to the ephemeral streams that ultimately feed into Boysen Reservoir. Although detailed analyses of site flooding potential have not been performed, flooding does not appear to be a concern at the Wyoming site because the site lies in an upland area.

Groundwater. The Wyoming site lies in the Wind River Basin in Central Wyoming. Groundwater occurs in coarse sand beds in the Wind River Formation, and most local wells are drilled to depths of 90 to 120 m (300 to 400 ft) to ensure adequate year-round water supply. Water quality is good at the depths of typical wells. The closest well to the site is located approximately 1,370 m (4,500 ft) from the site. Water quality and availability appear to be adequate to meet the ISFSI site construction and operational needs.

7.3.3 Air Quality

The area within 100 km (62 miles) of the alternative site in Wyoming is in attainment of all NAAQS. There is no *a priori* reason to believe that effects on air quality from construction and operation of an ISFSI at the Wyoming site would be appreciably different than at the proposed Skull Valley location. The most important factor in a more precise determination of the potential air quality impacts would be the location of the site with respect to its proximity to residences or other places likely to be frequented by members of the general public. Available information suggests that the nearest residences to the Wyoming site are about 1,400 m (4,500 ft) away. At that distance, impacts of construction activities would be expected to be appreciably greater than the impacts to the nearest residence at the proposed site in Skull Valley, who are 3.2 km (2 miles) away from the preferred Site A in Skull Valley.

7.3.4 Ecological Resources

Impacts to ecological resources for the alternative site in Wyoming would be similar to those for the proposed PFSF site in Skull Valley and are expected to be small.

Vegetation. The potential impacts on vegetation for an ISFSI located near Shoshoni, Wyoming, would be very similar to those associated with a facility located in Skull Valley, Utah. The Wyoming site is located in the desert and basin vegetation zone of Wyoming which has an elevational range of about 1,200 to 1,800 m (4,000 to 6,000 ft) and a xerophytic flora (i.e., vegetation adapted to dry and arid environments) (Porter 1962). This intermountain basin area of Wyoming contains a mosaic of shrublands including desert shrublands (Knight 1994). The specific ecoregion in which the site is located is variously identified as the Sagebrush-Wheatgrass section of the Wyoming Basin Province [covering an area of approximately 75,600 km^2 (29,200 miles^2)] (Bailey 1980) or as the boundary of the sagebrush steppe and wheatgrass-needlegrass shrub steppe (Küchler 1964). These ecoregions consist of open to dense grasslands that include widely dispersed to somewhat dense scatterings of shrubs. The primary vegetation within these regions is sagebrush or shadscale with a mixture of short grasses. Moist alkaline flats in this region support greasewood which is alkali-tolerant.

The useable area of the Wyoming site is mainly flat to gently sloping and is largely rangeland that is too arid to graze livestock economically (Gillespie et al. 1996; Stuart and Anderson 1998). On the site itself, the dominant vegetation in July was observed as short grasses with some shrubs, cacti, yucca, and vetches (Gillespie et al. 1996). No unique habitats are found in the vicinity (Stone & Webster 1996a). The Wyoming site could encompass about 1,093 ha (2,700 acres) (Stuart and Anderson 1998). The expected land area needed for storage area in Wyoming is assumed to be the same as in Skull Valley [i.e., 40 ha (99 acres)]. This area is less than 4 percent of the area available at the Wyoming site.

Wildlife. The only specific sources of information provided concerning the wildlife at the Wyoming site is a Field Investigation Evaluation Report from 1996 (Stone & Webster 1996a) and a letter from the Wyoming Natural Diversity Database (Smith 1999). Information from older projects in the general area in which the site is located (e.g., NRC 1980a, 1980b; DOE 1985) indicates that the fauna are generally typical of desert scrub grassland communities of the intermountain region. The most common predators in the area are the coyote (*Canis latrans*) and badger (*Taxidea taxus)*, which feed heavily on rodents and ground squirrels. Coyotes are also important predators of desert cottontails *(Sylvalagus audubonii)* and white-tailed jackrabbits (*Lepus townsendi*). Rodents are the most abundant small mammals in the area, and include such species as deer mice (*Peromyscus maniculatus*), northern grasshopper mice (*Onychomys leucogaster*), least chipmunk (*Butamias minimus*), and Richardson's ground squirrel (*Spermophilus richardsoni*). Large mammals that are likely to be present include mule deer, pronghorn antelope, and feral horses. Birds representative of sagebrush-grasslands and foothill scrub communities include such nesting passerine species as the horned lark (*Eremophila alpestris*), Brewer's sparrow *(Spizella brewerii*), sage thrasher (*Oreoscoptes montanus*), and the mountain bluebird (*Sialia currocoides*). Game birds such as sage grouse and mourning dove (*Zenaidura macroura*) are also likely to be present, as would raptor species such as kestrels, red-tailed hawks, ferruginous hawks, and burrowing owl.

Based on the available information, it appears that wildlife species composition at the Wyoming site is generally similar to that at the Skull Valley site. Thus, the impacts to wildlife at the two sites are expected to be similar and would be small.

Perennial and ephemeral streams. Impacts on streams would be small. Two ephemeral streams are located near the Wyoming site: Badwater Creek and Poison Creek. Drainage at the site is mainly subsurface except during infrequent local rain storms (Stone & Webster 1996a). Two or three dry washes occur within 1.6 km (1 mile) of the site. There is no aquatic habitat on or near the proposed Wyoming site; thus, there would be no impact to aquatic biota or perennial streams, as is also the case in Skull Valley.

Wetlands. Impacts on wetlands would be small. One area in the northern part of the site is classified as a wetland and would be avoided during construction (Stuart and Anderson 1998). Assuming that PFS would use BMPs similar to those proposed for Skull Valley, during construction, erosion would be effectively controlled in that area. Only if groundwater that is necessary to support this wetland were withdrawn for use by the project, would there be potential negative impacts. This is not likely since the groundwater that would be used for the project (see Section 7.3.2) would probably be drawn from a much greater depth than the groundwater that supports this wetland.

Threatened, endangered, and other species of special concern. The Field Investigation Evaluation Report documents that no surveys for rare or endangered species have been conducted on the site. According to the State of Wyoming, no endangered or threatened species use the Wyoming site. Table 7.2 lists species of special concern identified within the township under consideration for the Wyoming alternative site or within a one-township buffer zone around that site (i.e., a total of nine townships) (Smith 1999).

Two plant species are identified in Table 7.2 as species of special concern. Neither of the two plant species in that table is State or Federally listed. Both species were candidates for Federal listing in the past, but not enough information was available to determine if listing was appropriate. As of 1993, Owl Creek miner's candle (*Cryptantha subcapitata)* was considered to be declining, while the trend for persistent sepal yellowcress (*Rorippa calycina*) was unknown (58 Fed. Reg. 51143, Sept. 30, 1993).

Owl Creek miner's candle is a mat-forming perennial herb with white flowers that grows 5 to 15 cm (2 to 6 inches) high (Fertig 1994). The habitat for this species consists of sandy-gravelly slopes and desert ridges in sparsely vegetated cushion plant communities. The plants are potentially threatened by surface-disturbing activities. The entire distribution of this species is in the Owl Creek Mountains around Boysen Reservoir (Smith 1999), which is about 8 km (5 miles) from this alternative site. Two of the known four occurrences are located in the nine-township area around the alternative site.

Persistent sepal yellowcress, a member of the mustard family, is a rhizomatous, perennial herb with small yellow flowers (Fertig 1994). It is a regional endemic found along mudflats around reservoirs (Smith 1999) and, is therefore, unlikely to be present on this alternative site.

Whether either of these plant species occurs within the area that would be disturbed for a facility located at this site is unknown. Before this site would be used, surveys of potential habitat for these species would be necessary, and appropriate actions to mitigate effects on these species would have to be considered.

Table 7.2. Occurrences of species of concern in Fremont County, Wyoming, T38N R94W S23, and buffer zone[a]

Scientific name	Common name	Federal status (animals) or management status (plants)[a]	Global rank/State rank[b]	Wyoming Game and Fish status (animals)[c]	Number of occurrences in area
		Birds			
Gavia immer	Common loon	S-USFS R2 S-USFS R4	G5/S2B, SZN	WYGF-SSC1	1
Buteo regalis	Ferruginous hawk	N/A	N/A	SS	N/A
		Plants			
Cryptantha subcapitata	Owl Creek miner's candle		G2/S2		2
Rorippa calycina	Persistent sepal yellowcress		G3/S2S3		5

[a]S-USFS R2 = designated sensitive, U.S. Forest Service, Region 2; S-USFS R4 = designated sensitive, U.S. Forest Service, Region 4;

[b]"G" Rank; G1 = Extremely rare, only 1 to 5 populations known throughout the world. May be critically imperiled; G2 = Very rare, between 6 and 20 known populations world-wide. May be imperiled; G3 = Rare, between 21 and 100 known populations worldwide; G4 = Apparently secure globally, over 100 populations, although it may be quite rare in portions of its range, especially on the periphery; G5 = Secure under present conditions; "S" Rank: State Ranks are preceded by an "S" and also range from 1 to 5, as above, with 1 being the rarest (only 1 to 5 populations within the State) and 5 being the most common (secure within the State); State Ranks have been augmented for migratory animals, primarily birds: A "B" following a State Rank will indicate the breeding status of the species within the State: Breeding Ranks range from 1 to 5, as above; "SZN" indicates species which are not of significant status when migrating through or wintering in Wyoming. Includes uncommon migrants of interest, as well as (1) rare species for which important habitats could be protected, but are difficult or impossible to define, and (2) abundant species wintering in or migrating through Wyoming.

[c]Wyoming Game and Fish Status—SSC1 = species with on-going significant habitat loss, populations greatly restricted or declining, and extirpation appears possible; SS = Wyoming state sensitive.

Source: Letter dated November 19, 1999, from Rebekah Smith, Wyoming Natural Diversity Database to Susan Davis, Stone and Webster.

Table 7.2 identifies two wildlife species in the vicinity of the Wyoming site as being of special concern. There is one record of the State-listed common loon (*Gavia immer*) on Boysen Reservoir, a few miles to the west of the site. Because no habitat exists on the proposed site for loons, no impacts to this species would be expected. There is also no record of any endangered or threatened species being present at the Wyoming site. The ferruginous hawk, a State-listed species in Wyoming, is reported to use the Wyoming site (Stone & Webster 1996a). This is in contrast to the Skull Valley site area, which may be used by the State-listed endangered peregrine falcon, the State-listed threatened ferruginous hawk, as well as a number of other species of concern as listed by the State of Utah and BLM.

7.3.5 Socioeconomic and Community Resources

The Wyoming site is located in a remote, sparsely populated area (see Table 7.3), and direct and indirect impacts to socioeconomic and community resources should be qualitatively and quantitatively similar to those at the remote, sparsely populated Skull Valley site. The only potentially significant difference in impacts to socioeconomic and community resources between the Wyoming site and the proposed Skull Valley site would be a function of different construction and operating requirements associated with the local transportation option and the relatively larger population centers in the immediate vicinity of the Wyoming site. As noted in Section 7.2, the Burlington

Table 7.3. Population in Fremont County and incorporated areas

		Estimated population				
	1990	**7/1/94**	**7/1/95**	**7/1/96**	**7/1/97**	**7/1/98**
Wyoming	453,588	474,894	478,364	480,060	480,043	480,907
Fremont County	33,662	35,080	35,607	35,851	35,959	36,044
Dubois town	878	960	1,000	1,015	1,024	1,034
Hudson town	389	404	410	410	413	412
Lander city	7,023	7,178	7,283	7,340	7,360	7,378
Pavillion town	103	129	131	134	136	140
Riverton city	9,202	9,794	9,957	10,061	10,100	10,126
Shoshoni town	497	512	519	521	524	527
Balance of Fremont County	15,570	16,103	16,307	16,370	16,402	16,427

Sources: U.S. Bureau of the Census, 1990 and U.S. Bureau of the Census, 1999.

Northern Railroad rail line runs adjacent to the Wyoming site. This would obviate the need to construct a lengthy rail line connecting the main line with a SNF storage facility or over-the-road heavy-haul shipments of the SNF canisters. This would eliminate or substantially reduce the adverse traffic impacts, as well as the favorable economic impacts to the Skull Valley Band, associated with local transportation identified for the Skull Valley site (see Section 5.5).

Operational activities at the Wyoming site are assumed to be equivalent to those described for the proposed Skull Valley site. As is true for the Skull Valley site, there should be no significant impacts to socioeconomic and community resources.

Considering impacts to all socioeconomic and community resources (e.g., population, housing, education, and transportation), the Wyoming site is not significantly different from the Skull Valley site, with the exception of the favorable benefits to the Skull Valley Band. Some of those benefits (e.g., employment) would accrue to other persons in the vicinity of the Wyoming site, including Native Americans at the nearby Wind River Reservation.

7.3.6 Cultural Resources

Cultural resources studies equivalent to those performed for the Skull Valley site have not been completed for the Wyoming site, nor has consultation been initiated with the Wyoming SHPO or the Wind River Shoshone Tribe. Preliminary site file searches for the Wyoming site indicate no known archaeological sites on the property. The closest NRHP property is the Castle Gardens Petroglyph Site, located near Moneta, some 32 km (20 miles) to the southeast.

The Wyoming site falls within the traditional homelands of the Wind River Shoshone Tribe (Shimkin 1947; Fox 1976). Today, the eastern boundary of the Wind River Indian Reservation is located about 5 km (3 miles) west of the Wyoming alternative site. Documentation of the presence or absence of traditional cultural locations on or near this site has not been completed, although no such cultural resource locations are known to exist at this time.

Based on available information, the Skull Valley and Wyoming sites are generally comparable, in that each is projected to have small potential for impacts to significant archaeological and historical resources, as well as traditional cultural properties important to regional Indian tribes. This preliminary assessment is based on the known cultural resource information for the Skull Valley site and the general ecological setting of the Wyoming site (e.g., absence of important natural resources for subsistence, landform relief, and permanent water sources). The lack of archaeological, historical, and Native American resource identification and evaluation studies at the Wyoming site do not permit the inclusion of specific mitigation measures; nevertheless, the general approaches listed in Section 4.6.5 for the identification and preservation or documentation of such resources would be applicable at the Wyoming site as well.

7.3.7 Human Health Impacts

Members of the general public and facility workers would be exposed to low levels of radiation during routine operation of an ISFSI in Wyoming. This would result in these individuals receiving a radiation dose. Because the design of an ISFSI in Wyoming is assumed to be identical to the proposed PFSF in Skull Valley, the dose to a hypothetical individual at the boundary of the facility in Wyoming would be the same as in Skull Valley (see Section 4.7.2). Similarly, doses to facility workers would be the same for the proposed PFSF.

Doses to the resident nearest the Wyoming site would be somewhat greater than for the nearest resident in Skull Valley, because the Wyoming resident is located at a closer distance [approximately 1 km (0.6 mile) as compared to approximately 3.2 km (2 miles) in Skull Valley]. Data for the variation of dose rate and distance, as presented in PFS's safety analysis report (PFS/SAR 2001), indicates that the annual dose to the resident nearest the Wyoming site would be approximately 0.02 mSv (2 mrem), which is well within the 0.25 mSv (25 mrem) criterion specified in 10 CFR 72.104 for maximum permissible annual whole body dose to any real individual. This dose represents about 0.7 percent of the natural background radiation dose in the United States (see Table 3.18), and is equivalent to an LCF risk of 1×10^{-6} or about one chance is a million of developing a fatal cancer from one year of operations. Because the nearest resident in Wyoming is closer than the nearest resident in Skull Valley, the radiological doses from accidents in Wyoming would be higher than those described in Section 4.7.2 for accidents in Skull Valley. However, the radiation doses would still be well within regulatory limits. The radiological impact to the nearest resident in Wyoming would therefore be small.

7.3.8 Other Impacts

7.3.8.1 Noise

Noise impacts from the construction and operation of an ISFSI at the Wyoming site would be expected to be similar to those of the proposed PFSF. Because a greater number of people live in closer proximity to the Wyoming site (as compared to the population around the Skull Valley site), noise may be more annoying, and annoy a greater number of people, at the Wyoming site. On the other hand, background noise in a small community would be appreciable greater than in the relatively unpopulated, extremely quiet area near the location being considered in Skull Valley; this would reduce impacts of some noises with respect to the existing environment.

7.3.8.2 Scenic Qualities

Construction and operation of the ISFSI at the Wyoming site would result in similar types of changes to the landscape as at the Skull Valley site (see Section 4.8.2). Facility construction and operation at the Wyoming site would have the direct impact of changing the scenic quality of the area by introducing an industrial presence into a largely undeveloped landscape, although areas close to the Wyoming site are more developed than Skull Valley in Utah. Facility construction would create the short-term visual impacts of additional dust from the operation of heavy equipment on-site and additional vehicle traffic on local roads. Facility operation would create long-term visual impacts through the contrast of a large industrial facility with the surrounding landscape, the contrast of security lights with the surrounding darkness at night, and the generation of additional vehicle traffic on local roads.

The Wyoming site is surrounded by a larger residential population than the Skull Valley site, meaning that a larger number of residential viewers would be affected in Wyoming than in Skull Valley. Also, at the Wyoming site the facility would be located closer to the surrounding residential population than at the Skull Valley site. Thus, the facility would be more visible to surrounding residents in Wyoming than in Skull Valley. The Wyoming site, however, is not surrounded by elevated areas that are important for wilderness recreation such as the Deseret Peak Wilderness area in Utah. Although there are about 100,000 visitors annually to Boysen State Park (J. Van Dyke, ORNL, Oak Ridge, Tenn., personal communication with Dave Wilson, Boysen State Park Superintendent, Riverton, Wy., Sept. 26, 2000), most of the recreation activities take place within areas where the proposed facility would not be visible—because of the difference in elevation and the distance of the proposed facility [5 km (3 miles)] from the recreational areas. The Wyoming site would be visible to traffic along Highways 20 and 26, which go to the south and west of the site. These highways have considerably more traffic than the Skull Valley Road; and, therefore, more motorists would have views of the Wyoming site than of the Skull Valley site.

7.3.8.3 Recreation

Most of the recreation in the area takes place in Boysen State Park which has about 100,000 visitors annually (J. Van Dyke, ORNL, Oak Ridge, Tenn., personal communication with Dave Wilson, Superintendent, Boysen State Park, Riverton, Wy., Sept. 26, 2000). The main recreation opportunities are water activities including fishing and boating on the Boysen Reservoir and the Wind River north of the reservoir. The proposed facility would not be visible to most of the recreation activities.

7.4 Impacts of Constructing and Operating SNF Transportation Facilities Near the Wyoming Site

The impacts of constructing and operating SNF transportation facilities in Skull Valley, Utah, are discussed in Chapter 5. The greatest difference between the Skull Valley site and the Wyoming site is the amount of land that would need to be cleared for the rail access corridors. In Skull Valley, approximately 314 ha (776 acres) would be cleared and graded, with approximately 63 ha (155 acres) being permanently cleared (i.e., for the life of the project). In comparison, the Wyoming site would only involve the clearing of approximately 10 ha (24 acres) for transportation facilities. In addition, the amounts of soil disturbance and construction material required for the 1.6-km (1-mile) rail line in Wyoming would be significantly less than for the 51-km (32-mile) rail line in Skull Valley.

Construction impacts for the rail line would be similar to those described in Section 7.3 for the SNF storage facility itself. Only in the areas of ecological resources and human health would the impacts for the rail access corridor differ substantively from what is presented in Section 7.3. These impacts are discussed below.

7.4.1 Ecological Resources

Impacts to ecological resources at the alternative site in Wyoming would be similar to those of the proposed action in Skull Valley which are predicted to be small with the application of appropriate mitigation measures.

Vegetation. The potential impacts on vegetation of constructing and operating transportation facilities for an ISFSI located near Shoshoni, Wyoming, would be small. They would be very similar to those associated with a facility located in Skull Valley, Utah as discussed in Section 5.4. However, a smaller amount of land would need to be cleared in Wyoming for transportation facilities. A new rail access corridor would be developed that would be less than 1.6 km (1 mile) long. Assuming that the width cleared for the rail corridor would be the same as in Skull Valley [i.e., 61 m (200 ft)], a maximum of about 10 ha (24 acres) would be cleared. Thus, based primarily on the need to clear less land for the project at the Wyoming site, the impact on vegetation would appear to be lower in Wyoming than for the proposed rail line in Skull Valley.

Wildlife. The greatest difference between the proposed action in Skull Valley and the Wyoming alternative is the amount of land cleared for the rail lines. In Skull Valley, approximately 314 ha (776 acres) would be cleared and graded, with approximately 63 ha (155 acres) being cleared for the life of the facility. The Wyoming site, in comparison, would involve the clearing of a maximum of only 10 ha (24 acres). This means that less wildlife habitat would be lost with the Wyoming alternative. This difference is unlikely to be significant, however, because predicted impacts for the Skull Valley transportation proposal, with the application of appropriate mitigation, would be small.

Wetlands. Impact on wetlands from a new rail line located near Shoshoni, Wyoming, would be small, because the wetland in the area (see Section 7.3.4) would be avoided.

Perennial and ephemeral streams. Impact on streams from a new rail line located near Shoshoni, Wyoming, would be small, because no streams would be crossed by the rail route.

Threatened, endangered, and other species of special concern. Impacts on plant and wildlife species of special concern would be small as none are known to be located in the area to be used for transportation facilities.

7.4.2 Human Health Impacts

The potential human health impacts resulting from construction and operation of transportation facilities at the Wyoming site, as well as the impacts (including possible transportation accidents) during the cross-country transportation of SNF to Wyoming, are discussed in this section. The human health impacts associated with construction and operation of an SNF storage facility at the Wyoming site are discussed in Section 7.3.7.

7.4.2.1 Non-Radiological Impacts

Potential worker injuries during construction and operations. Potential health impacts to workers during construction and operation of the new rail line in Wyoming would be similar to those described and analyzed in Section 5.7.2 for the Skull Valley site, with the exception that only about 1.6 km (1 mile) of new rail line would need to be constructed to access the Wyoming site. Non- radiological health impacts would, therefore, be even smaller than the impacts for a rail corridor in Skull Valley, which have been determined to be small (see Section 5.7.2).

Direct impacts and risks of cross-country transportation of SNF. The non-radiological risks for shipments of SNF to and away from the Wyoming site would be similar to those for the proposed PFSF in Skull Valley. The impacts of such shipments to and from Skull Valley are discussed in Section 5.7.2.

The average distance by rail from nuclear power reactors east of the Wyoming site is 2,856 km (1,775 miles). If each SNF train travels an average of 2,856 km (1,775 miles), the total distance covered by the trains for the entire campaign for shipping 4,000 SNF canisters (at one per railcar) to the facility would equal 11.4×10^6 railcar-km (7.1×10^6 railcar-miles). For trains eventually transferring casks away from the Wyoming site to a permanent repository, the rail distance is estimated to be 2,201 km (1,368 miles). Thus, the total distance covered by trains in transferring all 4,000 canisters to the national repository (at one canister per railcar) would be 8.8×10^6 railcar-km (5.5×10^6 railcar-miles). Therefore, the total distance associated with the entire lifetime set of operations (i.e., both receiving SNF at and shipping SNF from the Wyoming ISFSI) would be 20.2×10^6 railcar-km (12.6×10^6 railcar-miles). A round-trip calculation is included in this analysis to provide an upper bound on the number of railcar-km. The round-trip distances for the lifetime set of operations would then be 40.4×10^6 railcar-km (25.2×10^6 railcar-miles).

Using the equations in Section 5.7.1.2, the direct, non-radiological transportation risks associated with the Wyoming site would be:

$$(4.26 \times 10^{-8} \text{ injuries/railcar-km}) \bullet (40.5 \times 10^6 \text{ railcar-km}) = 1.72 \text{ injuries, and}$$
$$(2.27 \times 10^{-8} \text{ fatalities/railcar-km}) \bullet (40.5 \times 10^6 \text{ railcar-km}) = 0.92 \text{ fatalities}$$

over the 40-year assumed lifetime (original license plus 20-year renewal) of the facility.

As was discussed in Section 5.7.1.2, Saricks and Kvitek (1994) noted that dedicated trains—such as would be used to transport SNF—spend much less time in rail yards than do regular trains, since dedicated trains do not undergo classification. Thus, it appears that the injuries and fatalities based on national averages are not as relevant for dedicated trains as they are for regular trains. Should the large portion of casualties which occur in rail yards be excluded from the national averages, the injury rate would decrease by a factor of almost 7 and the fatalities would decrease by a factor of about 36.

Indirect impacts and risks of cross-country transportation of SNF. The methods of assessing indirect impacts (including latent mortality from atmospheric emissions of locomotives) are discussed in Section 5.7.1.3. Such impacts associated with an SNF storage facility in Wyoming would be similar to those for the proposed PFSF in Skull Valley. Again, the difference would be primarily in the distance to a national repository for shipments leaving the proposed storage facility.

Using the equations in Section 5.7.1.3, the indirect, non-radiological transportation risk associated with the Wyoming site would be:

$$(1.3 \times 10^{-7} \text{ latent fatalities/train-km}) \bullet (40.5 \times 10^{6} \text{ railcar-km}) \div (4 \text{ railcars per train}) = 1.32 \text{ latent fatalities,}$$

if it is assumed that the total population along the rail routes is "urban." This is a very small risk over the assumed 40-year lifetime (original license plus 20-year renewal) of the proposed facility.

7.4.2.2 Radiological Impacts

The radiological human-health impacts of transporting SNF would include exposure of the public and transportation workers (e.g., the train crew) to ionizing radiation, thereby resulting in members of the general public and the workers receiving a radiation dose. The radiological impacts of spent fuel transportation presented in this section include estimates of dose from incident-free transportation of SNF and from potential SNF transportation accidents. As described below, these impacts would be expected to be small.

For cross-country transportation to the alternative ISFSI site in Wyoming, only shipments by rail are analyzed because of the size and weight of the shipping casks that are proposed for use by PFS. This FEIS also evaluates the impacts of transporting SNF from the Wyoming site to a permanent repository. A Draft Environmental Impact Statement prepared by DOE (see DOE 1999) addresses in detail the national and regional transportation impacts of building and operating a proposed permanent repository at Yucca Mountain, Nevada. Congress, in the Nuclear Waste Policy Act, as amended (NWPA), has directed the DOE to study one candidate repository, namely, a repository proposed at Yucca Mountain, Nevada. To reflect the provisions of the NWPA, the NRC staff has examined the shipment of SNF via rail from the proposed PFSF, on its way to a permanent repository in the western United States, as if such a repository were located at Yucca Mountain, Nevada, although that location may or may not become the actual repository. Accordingly, the NRC staff examined the shipment of SNF via rail from the alternative Wyoming site to the Utah-Nevada border.

Summary of findings. The annual radiological impacts (as measured by public doses and their corresponding LCF risk values) of transporting SNF to the alternative site in Wyoming are summarized in Tables 7.4 and 7.5. For the maximally exposed individual (MEI) (see Section 5.7.2.4) along this route, the dose would be 1.1×10^{-6} Sv (1.1×10^{-4} rem) annually or 2.2×10^{-5} Sv (2.2×10^{-3} rem) for the shipment of 4,000 casks over a 20-year period. The corresponding risk to this MEI would be an LCF of 5.5×10^{-8} and 1.1×10^{-6}, respectively. The impacts of transporting SNF to the Wyoming site are similar to the all-rail impacts of transporting SNF to the proposed PFSF in Skull Valley.

Table 7.4. Doses associated with SNF shipments from the Maine Yankee reactor to the alternative site in Wyoming

Incident-free dose [person-Sv (person-rem)]		Accident dose to public [person-Sv (person-rem)]
Transportation crew	**Public**	
	Annual—200 casks per year	
0.0113 (1.13)	0.0854 (8.54)	0.0365 (3.65)
	20-year campaign—4,000 casks	
0.226 (22.6)	1.71 (171)	0.73 (73)

Table 7.5. Radiological risks associated with SNF shipments from the Maine Yankee reactor to the alternative site in Wyoming

Incident-free risk (LCF)		
Transportation crew	**Public**	**Accident risk to public (LCF)**
	Annual—200 casks per year	
4.52×10^{-4}	4.27×10^{-3}	1.83×10^{-3}
	20-year campaign—4,000 casks	
9.04×10^{-3}	8.54×10^{-2}	3.65×10^{-2}

Tables 7.6 and 7.7 show the public doses and corresponding LCF risk values for shipments of SNF away from the Wyoming site to the Utah-Nevada border. For the MEI (see Section 5.7.2.4) along this route, the dose would be 5.5×10^{-7} Sv (5.5×10^{-5} rem) annually or 1.1×10^{-5} Sv (1.1×10^{-3} rem) for 4,000 casks over a 20-year period. The corresponding risk to this MEI would be an LCF of 2.75×10^{-8} and 5.5×10^{-7}, respectively. While the doses along this route would be small for the Wyoming site, they would be higher than for similar shipments from the proposed PFSF in Skull Valley due to the shorter route length and lower population densities for the route from Skull Valley.

Table 7.6. Doses associated with SNF shipments from the alternative site in Wyoming to the Utah-Nevada border

Incident-free dose [person-Sv (person-rem]		Accident dose to public [person-Sv (person-rem)]
Transportation crew	**Public**	
	Annual—200 casks per year	
0.004 (0.40)	0.0071 (0.71)	0.0042 (0.42)
	20-year campaign—4,000 casks	
0.08 (8.00)	0.14 (14.2)	0.084 (8.40)

Table 7.7. Radiological risks associated with SNF shipments from the alternative site in Wyoming to the Utah-Nevada border

Incident-free risk (LCF)		
Transportation crew	**Public**	**Accident risk to public (LCF)**
	Annual—200 casks per year	
1.60×10^{-4}	3.55×10^{-4}	2.10×10^{-4}
	20-year campaign—4,000 casks	
3.20×10^{-3}	7.10×10^{-3}	4.20×10^{-3}

Approach to the analysis. The approach to the analysis of transportation risks, including descriptions of the models used and the assumptions employed, is discussed in Section 5.7.2. This same analytical approach is used for SNF transportation involving the Wyoming site. As was done in Section 5.7.2 for the Skull Valley analyses, it was assumed that each shipment of SNF to the Wyoming site would travel from the Maine Yankee reactor (in the state of Maine) and would pass through many of the high-population northeast and midwest transportation corridors.

All casks and conditions for the incoming SNF shipments [e.g., 4 casks per train, 50 trains per year, 200 casks per year, external dose rate from the cask of 0.13 mSv/hr (13 mrem/hr) at 1 m (3 ft), etc.] were assumed to be the same as for the analysis in Section 5.7.2 for the proposed PFSF in Skull Valley.

The analyses were performed using RADTRAN4 with 1990 census information. Since these shipments would not be initiated until the first part of this century, the population exposures were increased by 30 percent to account for the anticipated increase in the general population between the years 1990 and 2020 (see Section 5.7.2.3).

The Wyoming site is located approximately 1.6 km (1 mile) south of the existing Burlington Northern Santa Fe railway main line that runs through the central part of Wyoming. The route from Maine Yankee to the Wyoming site would be approximately 3,927 km (2,440 miles) long and would pass through major cities, such as Portland, ME, Buffalo, NY, Cleveland, OH, Chicago, IL, and other cities enumerated in Section 5.7.2.3 of this FEIS. (This compares to 4,476 km (2,781 miles) from Maine Yankee to the proposed Skull Valley site.) The route is illustrated in Figure 7.3 and is described in detail in Appendix C of this FEIS. Due to the number of nuclear power reactors in the eastern United States, most SNF shipments would approach the Wyoming site from the east through central Nebraska and into Wyoming. The population densities and route fractions for the Maine Yankee-to-Wyoming route are shown in Table 7.8.

Table 7.8. Data characteristics for the route from the Maine Yankee reactor to the Wyoming site

Parameter	**Data value**
Route length	3,927 km (2,440 miles)
Urban fraction	0.04
Suburban fraction	0.25
Rural fraction	0.71
Urban population density	2,383 people/km^2 (6,170 people/mile^2)
Suburban population density	333 people/km^2 (862 people/mile^2)
Rural population density	10 people/km^2 (26 people/mile^2)

Shipments to a final repository. SNF stored at the Wyoming site would be shipped to a permanent repository. DOE has examined various options to receive rail shipments of SNF at the proposed Yucca Mountain repository ranging from the construction of a new rail line to the use of heavy-haul vehicles from intermodal facilities along existing rail routes in Nevada. Because DOE has not yet made a decision, and the proposed Yucca Mountain repository has not been approved or reviewed by the NRC staff, this study examines only the shipment of SNF from the Wyoming site to the Utah-Nevada border.

The route is illustrated in Figure 7.4 and is discussed in detail in Appendix C of this FEIS. The route would pass through major western cities, such as Cheyenne, WY, Ogden, UT, and Salt Lake City, UT.

Wyoming and regional impacts. This analysis also included the impacts of transporting SNF in the region (i.e., considered to be in and near Wyoming). To analyze the regional impacts, the INTERLINE routing model (see Appendix C) was used to examine possible rail access routes to the Wyoming site. Four such routes were identified. The distances of these routes ranged from 350 to 400 km (220 to 250 miles). The routes are illustrated in Figure 7.5.

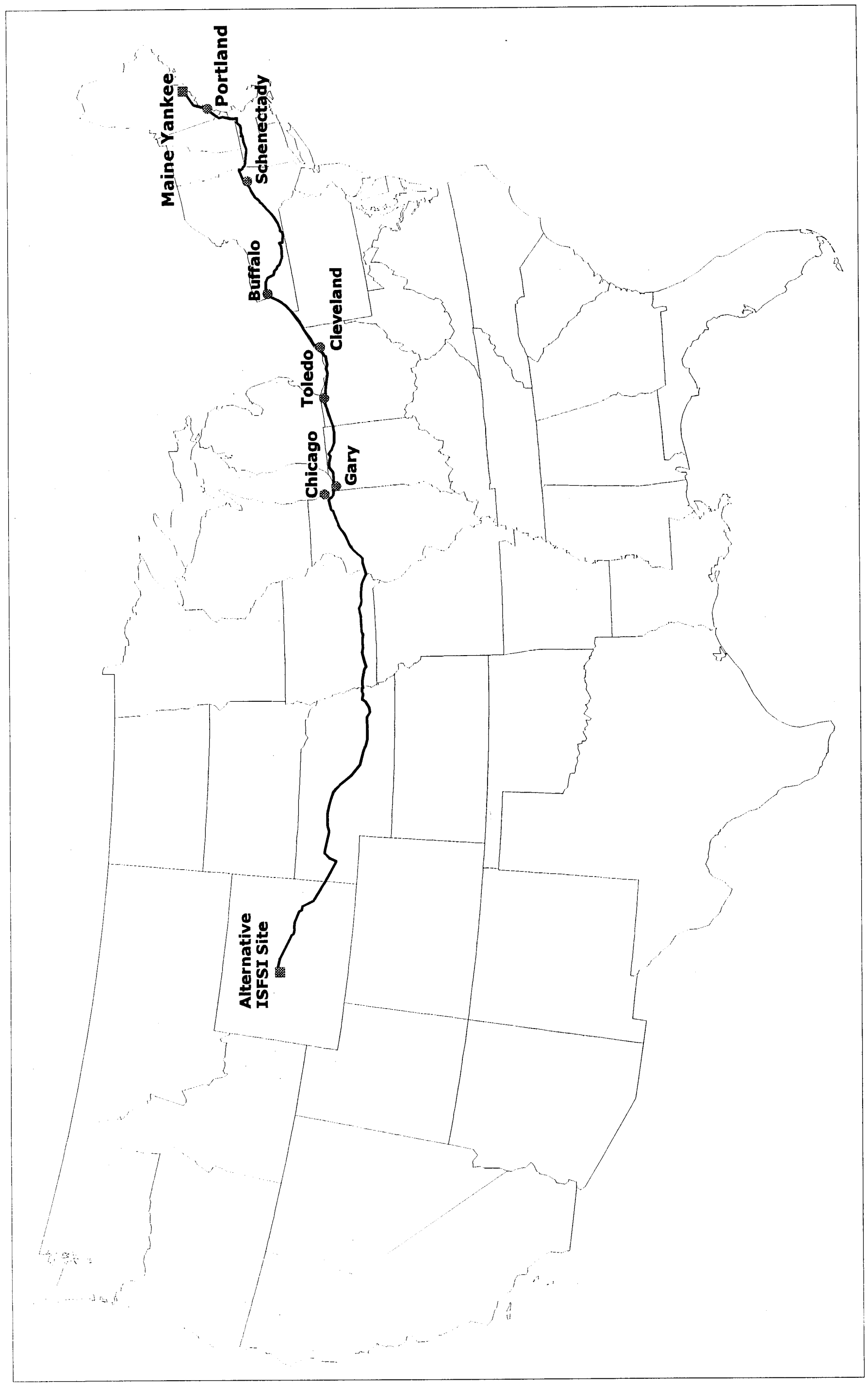

Figure 7.3. Potential cross-country rail route from the Maine Yankee nuclear power plant to Fremont County, Wyoming.

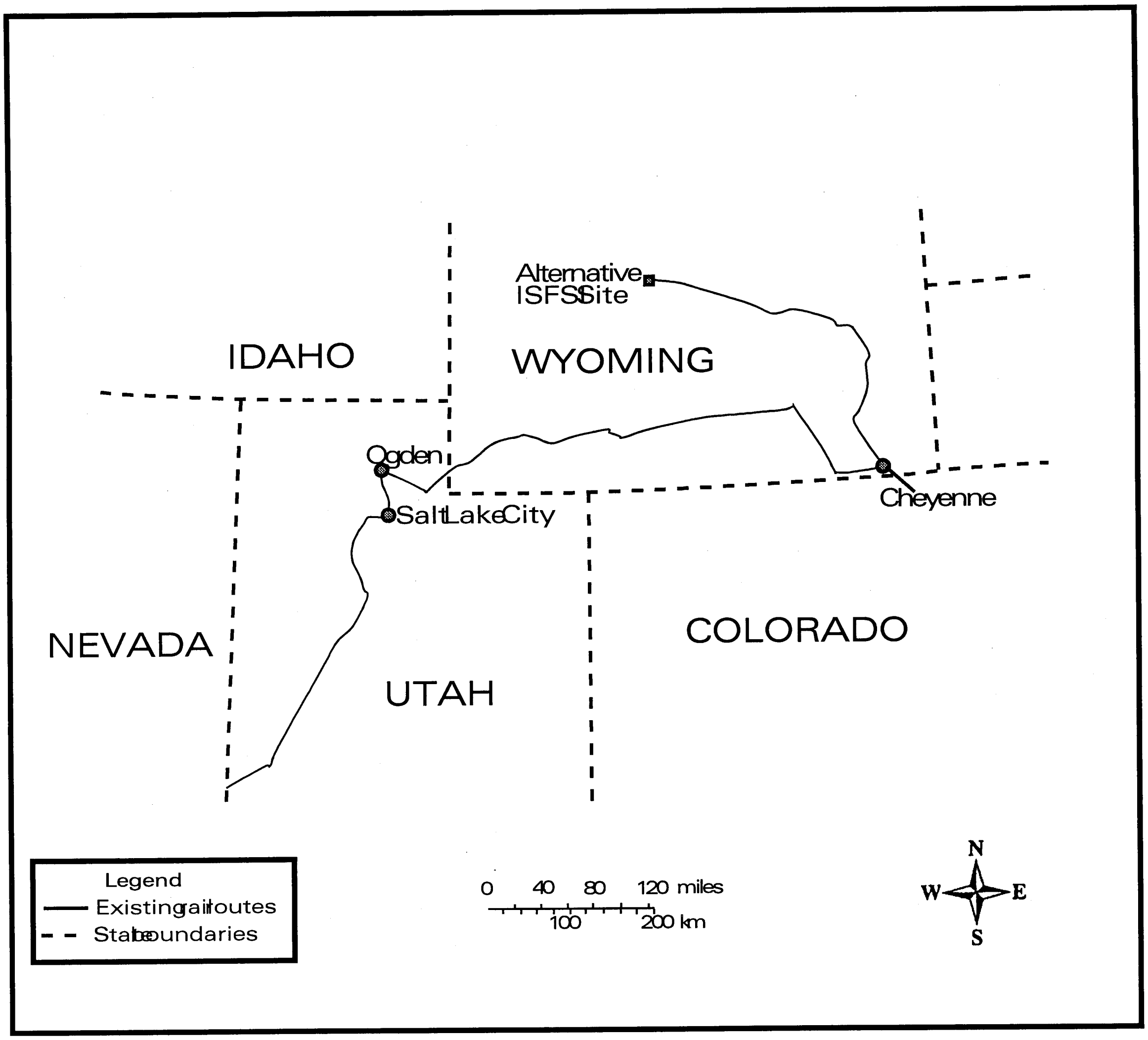

Figure 7.4. Potential rail route from the Fremont County, Wyoming, site to the Utah-Nevada border.

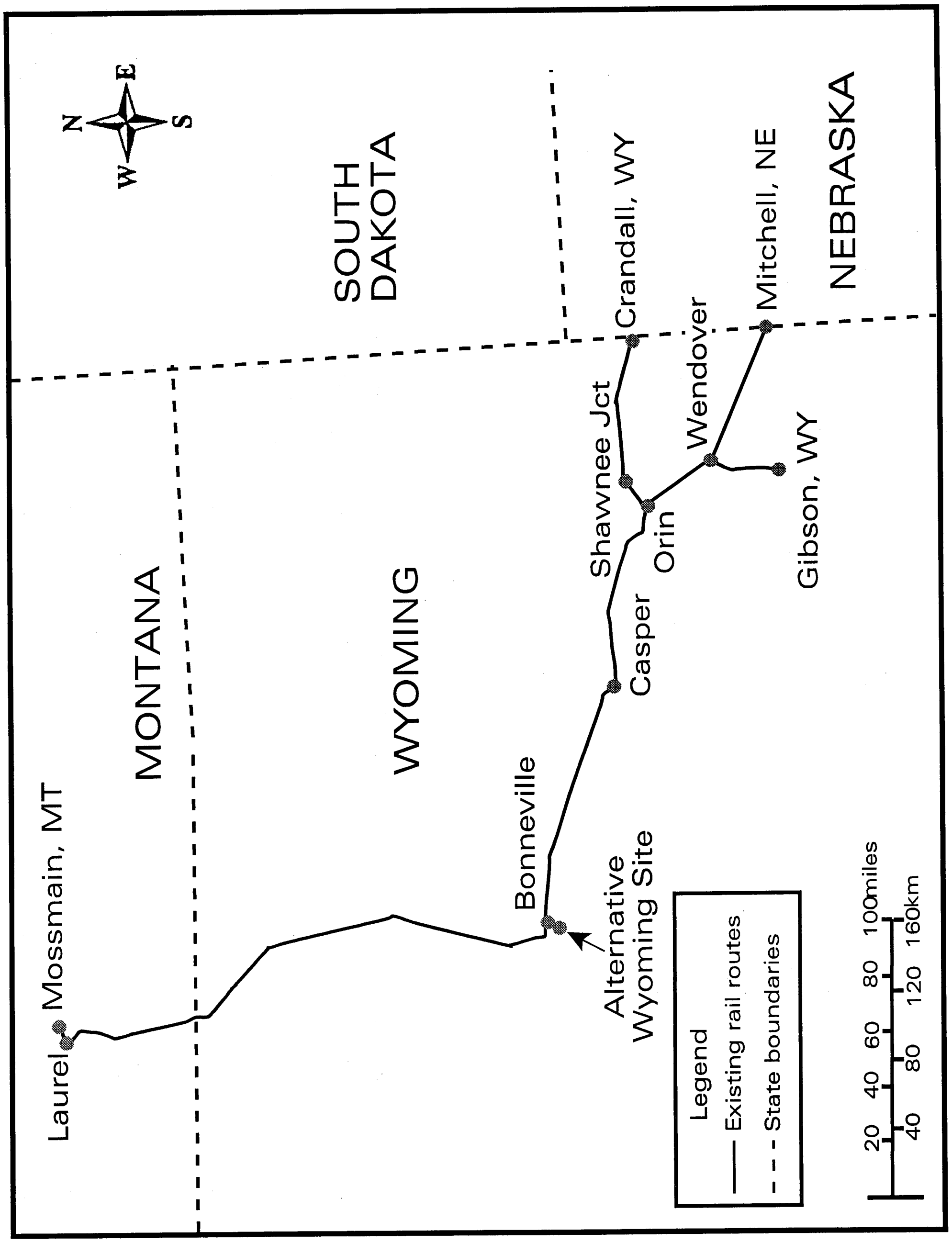

Figure 7.5. Potential rail routes for shipping spent nuclear fuel to Fremont County, Wyoming.

In estimating the potential radiological impacts, the NRC staff conservatively assumed that all 200 casks to be shipped annually, as well as the entire 40,000 MTU to be shipped over the lifetime of the facility, would be shipped along each of the four possible routes to and from the facility. The radiological impacts from transportation of SNF along these routes are summarized in Table 7.9. For a detailed discussion of the regional analysis, see Appendix D. From these results, it can be concluded that the overall radiological impact is small and would be similar to the radiological impact for transportation of SNF to and from Skull Valley.

7.5 Environmental Justice Considerations Near the Wyoming Site

The NRC staff examined the geographic distribution of minority and low income populations within 80 km (50 miles) of an SNF storage facility at the Wyoming site. 1990 U.S. Census data were used to identify minority and low-income populations near the Wyoming site in the same manner as at the preferred site (Site A in Skull Valley).

7.5.1 Demographics

7.5.1.1 Minority populations

The significant minority populations near the proposed Wyoming alternative site are Native Americans who reside on and near the Wind River Reservation. This is illustrated in Figure 7.6, which highlights the geographic distribution of Census block groups meeting the criteria for minority populations in the 1990 U.S. Census within 80 km (50 miles) of the Wyoming site. The nine block groups satisfying these criteria are located within the shaded area generally indicated by the heavy arrows.

Minority populations near the Wyoming site were identified using the same criteria applied in Section 6.2.1 for the Skull Valley site (i.e., where the minority population exceeds 50 percent or where the percentage of the minority population of the impact assessment area is at least 20 percentage points greater than the minority population percentage in the geographic area of study). As in the environmental justice analysis performed for the preferred site in Skull Valley, the impact assessment area for the Wyoming site also was expanded to 80 km (50 miles) to examine transportation routes into the facility and the percentage criterion. The percentage criterion was left at 20 percentage points; however, the NRC staff examined a 10 percentage point difference to see if additional relatively small pockets of low income and minority residences could be identified.

Table 7.10 shows these data. Similar to the outcome for the Skull Valley analysis, relaxing the criteria would have expanded the number of block groups counted as minority block groups from 9 to 18, but would not have significantly changed the picture of their location. These additional block groups tend to be adjacent to those already identified using the 20-percentage point criteria. One minority block group is located immediately south of the Wyoming site (Tract 9825, Block Group 3) (see Figure 7.6).

Table 7.9. Summary of the cumulative annual and 20-year campaign risks (as measured by latent cancer fatalities) for the shipment of spent nuclear fuel by rail to the alternative Wyoming ISFSI site

To the Wyoming site from:	Annual risks (LCFs) from 1 year rail shipments			Risks (LCFs) from 20 years of rail shipments		
	Incident-free risk		Accident risk	Incident-free risk		Accident risk
	Crew	Public	Public	Crew	Public	Public
Crandall, WY	2.30×10^{-4}	7.30×10^{-5}	3.60×10^{-5}	4.61×10^{-3}	1.46×10^{-3}	7.20×10^{-4}
Gibson, WY	2.31×10^{-4}	7.65×10^{-5}	3.69×10^{-5}	4.62×10^{-3}	1.53×10^{-3}	7.38×10^{-4}
Mitchell, NE	2.34×10^{-4}	7.95×10^{-5}	3.76×10^{-5}	4.67×10^{-3}	1.59×10^{-3}	7.52×10^{-4}
Mossmain, MT	2.31×10^{-4}	4.42×10^{-5}	1.28×10^{-5}	4.62×10^{-3}	8.84×10^{-4}	2.56×10^{-4}

Table 7.10. Minority and low-income block groups within 80 km (50 miles) of the alternative site in Fremont County, Wyoming

(Boldface entries = 20 percent criterion; Italicized entries = 10 percent criterion)

County and tract	Block group	Persons	Below poverty level (percent)	Total whites (percent)	Black (percent)	Native American (percent)	Asian and Pacific Islander (percent)	Other (percent)	Hispanic (all races) (percent)	Minorities (racial minorities plus white hispanics) (percent)
State of Wyoming		453,588	11.9	94.2	0.7	2.2	0.6	2.3	5.5	8.9
Threshold for environmental justice concern		—	31.9	—	20.7	22.2	20.6	22.3	25.5	28.9
Washakie										
9902	5	18		83.3	0.0	*16.7*	0.0	0.0	*16.7*	
Hot Springs										
9877	4	116	16.0	74.1	0.0	**25.0**	0.0	0.9	1.7	**29.1**
9877	5	24	0.0	79.2	0.0	0.0	0.0	*20.8*	*20.8*	*20.8*
Fremont										
9825	1	143	*30.5*	95.1	0.0	0.0	0.0	4.9	6.3	5.6
9825	3	17	0.0	64.7	0.0	0.0	0.0	**35.3**	**35.3**	**35.3**
9826	2	30	**100.0**	100.0	0.0	0.0	0.0	0.0	0.0	0.0
9828	1	617	*30.0*	83.5	0.2	*14.3*	0.2	1.9	3.4	*18.2*
9828	2	362	**32.1**	80.9	0.0	*16.9*	0.6	1.7	4.4	*20.4*
9829	2	81	**40.8**	98.8	0.0	0.0	0.0	1.2	1.2	1.2
9831	4	369	15.1	79.7	0.0	*19.5*	0.0	0.8	1.9	*23.1*
9832	1	604	**76.4**	24.0	0.0	**74.2**	0.0	1.8	4.3	**76.0**
9832	2	1,135	**44.6**	15.8	0.2	**82.9**	0.0	1.1	5.6	**84.2**
9832	3	669	*24.7*	44.4	0.0	**53.7**	0.1	1.8	3.4	**55.6**
9832	4	1,632	**42.9**	5.3	0.3	**93.9**	0.0	0.5	3.0	**94.7**
9832	5	1,199	**39.3**	12.1	0.0	**87.5**	0.1	0.3	6.1	**89.7**
9832	6	204	**56.3**	21.1	0.5	**73.5**	0.0	4.9	10.8	**78.9**
9832	7	269	*23.7*	66.2	0.0	**33.5**	0.4	0.0	1.9	**33.8**
9833	1	626	*23.6*	90.1	1.6	5.4	0.3	2.6	3.7	9.9
9833	4	692	**34.3**	79.6	0.3	*17.3*	0.0	2.7	5.8	*23.9*
9833	5	603	19.8	84.2	0.3	11.1	0.2	4.1	14.1	*25.2*
9833	6	673	**39.1**	81.9	0.0	10.8	0.3	7.0	13.2	*18.1*
9834	3	292	*31.3*	96.6	0.0	2.7	0.7	0.0	6.5	11.0
9834	4	240	**49.6**	85.0	0.0	*12.5*	0.0	2.5	3.8	*17.7*
9834	5	613	*22.1*	84.5	0.0	10.0	0.3	5.2	10.6	*20.0*

Native Americans reside principally on the northern and southern thirds of the Wind River Reservation, several miles to the west of the Wyoming site. Although the largest minority group in Fremont County is Native American, the minority block group nearest to the proposed PFSF site is an Hispanic community (Tract 9825, Block Group 3). This block group is approximately 1.6 km (1 mile) from the site and stretches from immediately south of the site to the east and southeast. No other significant minority populations were identified in any census block group either close to the Wyoming site or along the proposed transportation corridors into the site. This indicates that other minority populations are either well-mixed into the majority population, or that other minority populations are too small to be captured in the census data. The Native Americans on the northern and southern thirds of the Wind River Reservation and the Hispanic community near the Wyoming site represent the minority populations that have the potential to experience high and adverse impacts and, therefore, warrant consideration in an environmental justice evaluation.

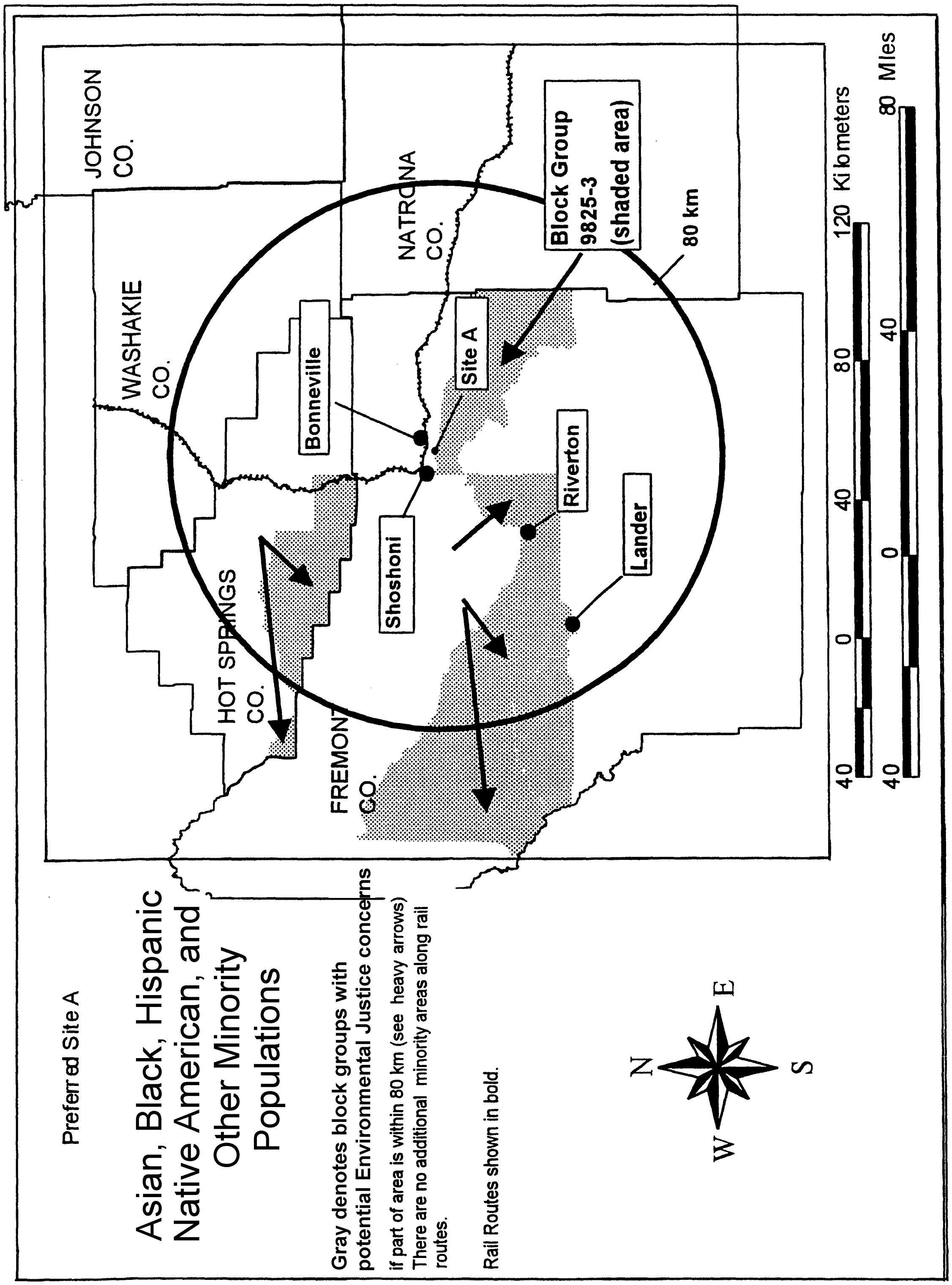

Figure 7.6. Geographic distribution of minority census block groups within 80 km (50 miles) of the alternative site in Fremont County, Wyoming.

7.5.1.2 Low-Income populations

Figure 7.7 shows the distribution of low-income populations for the impact assessment area out to 80 km (50 miles) from the Wyoming site by shading, open circles (for small block groups), and heavy arrows. These are disproportionately the residents of the Wind River Reservation. Both within and beyond 80 km (50 miles), the principal low-income areas appear to correspond mainly with the local Native American communities. Although there are several low-income populations within 80 km (50 miles), no low-income community is within 6 km (4 miles) of the Wyoming site.

7.5.2 Assessment of Impacts

Because the impacts from the construction and operation of the proposed ISFSI at the Wyoming site would be generally similar to those incurred at the Skull Valley site, any negative environmental justice impacts of the Wyoming alternative are expected to be similar in scope and type to those at the Skull Valley site with the following principal exceptions. First, because the Wyoming site is on private land, the Native Americans on the Wind River Reservation will not have the opportunity to benefit from lease payments, although it is possible that they could benefit from employment at the site. Second, while it is not clear if Native Americans or other minority and low-income groups use the area in the vicinity of the Wyoming site for subsistence activities, there is very little use of the area near the privately-owned Wyoming site for cultural or subsistence purposes. The impact on cultural resources or activity or subsistence activity of the Wyoming alternative likely would be small. Thus, no disproportionately high and adverse impact would occur to minority and low-income communities at the Wyoming site. Considering the positive and negative impacts from the proposed PFSF, the Wyoming alternative is not significantly different from the preferred site in Skull Valley from an environmental justice perspective.

7.6 Comparison of the Skull Valley, Utah, and Wyoming Sites

Table 7.11 compares the potential impacts of constructing and operating an SNF storage facility (and its associated transportation facilities) in Wyoming with those of such a facility and rail line facilities in Skull Valley, Utah. Note that NRC has no authority to decide the location of the proposed PFSF; NRC's decision, as described above, is either to grant or deny PFS's license application for the Skull Valley location. The Wyoming site is evaluated in this FEIS for the purpose of comparing potential impacts against the proposed PFSF in Skull Valley. 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 the Skull Valley site for the purpose of constructing and operating the proposed PFSF.

With two possible exceptions (as discussed below), 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.

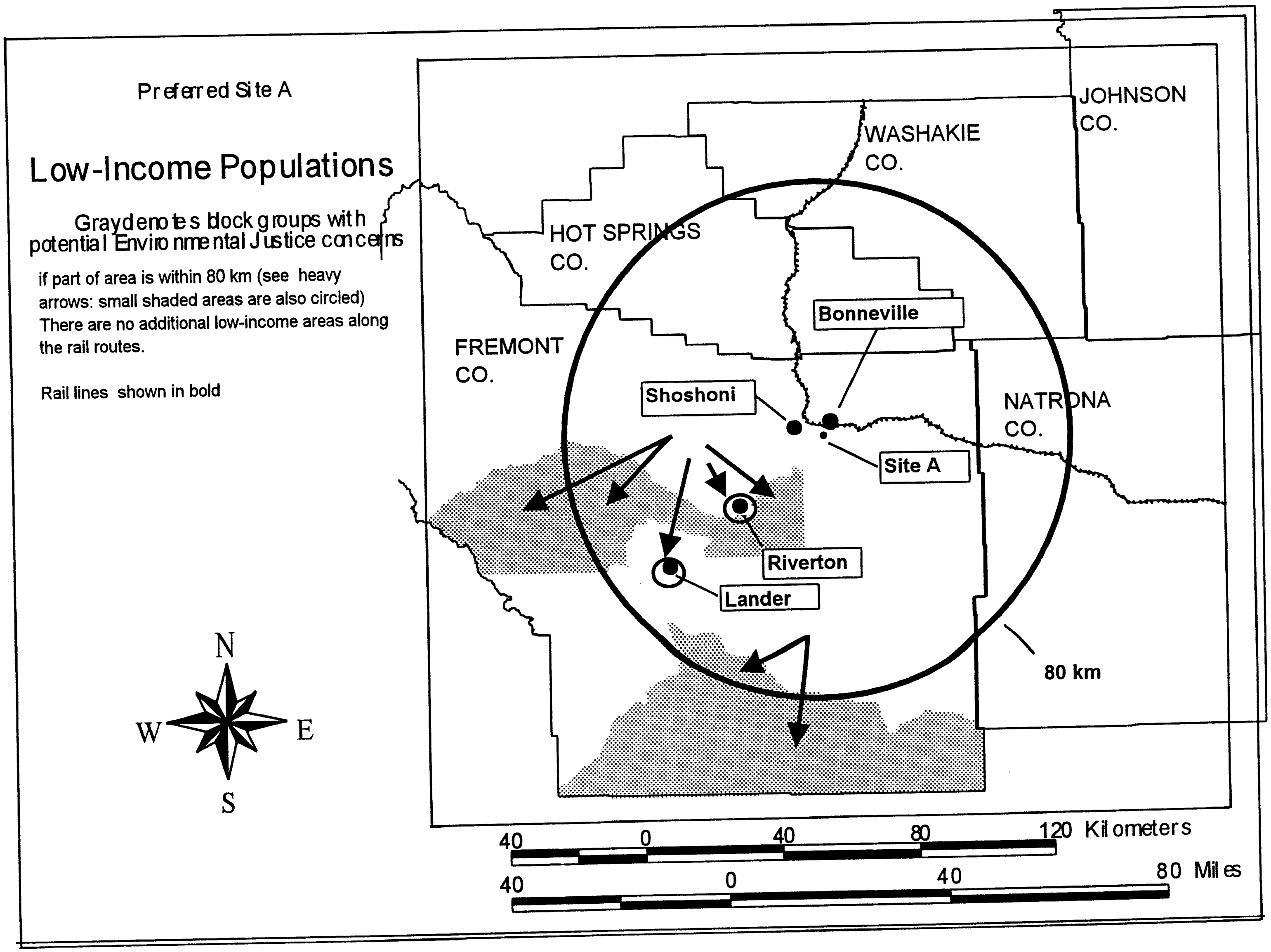

Figure 7.7. Geographic distribution of low-income census block groups within 80 km (50 miles) of the alternative site in Fremont County, Wyoming.

Construction and operation of an ISFSI at the Wyoming site would cause fewer impacts than at 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 to the proposed PFSF 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 would be required 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 adverse 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.

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

In regard to all other potentially affected resources, neither the Skull Valley site nor the Wyoming site appears to be appreciably different. In numerous respects, the Wyoming site appears to have smaller impacts than those at the proposed Skull Valley site, primarily due to the much shorter rail line that would need to be constructed. In several respects, however, impacts at the Wyoming site may be greater than at the Skull Valley site, primarily due to its close proximity to the nearest resident and nearby population centers. None of these differences, however, appears to be significant. Therefore, based on the above, the NRC staff concludes that the construction and operation of an ISFSI at the Wyoming site is not an obviously superior alternative to the proposed action.

Table 7.11. Summary and comparison of potential environmental impacts between an SNF storage facility at the Skull Valley, Utah, site and at the Fremont County, Wyoming site

Site A in Skull Valley with a new rail line (i.e., the proposed action)	Alternative site in Wyoming[a]
Geology, Soils, and Mineral Resources	
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.	Like the proposed site (Site A in Skull Valley), the impacts to soils and economic geologic resources will occur. Because a much shorter rail line would be required at the Wyoming site, soils disturbance and geologic resource commitments would be less than at the proposed Skull Valley site. Impacts from the unavailability of mineral resources beneath the site would be the same as for the proposed site.
Surface Water	
SMALL. Some modification of surface drainage patterns could occur; however, there would be no adverse effects during normal weather conditions.	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.
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 PFSF.	Potentially smaller impacts from watershed-scale flooding than at the Skull Valley site.
Water Use	
SMALL. Most water required for construction would be purchased from commercial suppliers. On-site groundwater use would involve small quantities.	Less water would be required for construction at the Wyoming site because of a much shorter rail access corridor than in Skull Valley.
Groundwater	
SMALL. Little to no potential for impacts to other groundwater users or to groundwater quality.	Residential wells are known to exist within 1.6 km (1 mile) of the Wyoming site. Groundwater quantity may be affected, although this could be mitigated by use of commercial water sources.
Air Quality	
SMALL TO MODERATE. Large amounts of fugitive dust from earth disturbance would occur during construction of the storage facility, and of the rail line where it runs close to Interstate 80. Air quality impacts would be small for the storage facility, 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.	Impacts at the Wyoming site are likely to be greater than those at the Skull Valley site due to the proximity of construction areas to the nearest residence and nearby population centers in the vicinity of the Wyoming site.

Table 7.11 (continued)

Site A in Skull Valley with a new rail line (i.e., the proposed action)	Alternative site in Wyoming[a]
Terrestrial Ecology	
Vegetation. SMALL. Clearing of approximately 408 ha (1,008 acres) of land for construction of the proposed facility 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 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 much shorter.
Wildlife. SMALL. Construction of the proposed facility 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 facility and the raised rail bed would be expected to alter movement patterns of larger animals, but such impacts should be small if BLM-recommended mitigation to provide crossings of the rail line are implemented. Operation of the proposed facility 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 for a facility in Wyoming would be similar to those for a facility in Skull Valley. 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 much shorter rail line required for the Wyoming site.
Wetlands. SMALL. No impacts to wetlands from construction of the proposed facility 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 indirectly from increased recreational use by temporary construction workers.	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.
Perennial and ephemeral streams. SMALL. No impacts to streams are expected to occur on the proposed 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 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.

Table 7.11 (continued)

Site A in Skull Valley with a new rail line (i.e., the proposed action)	Alternative site in Wyoming[a]
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 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. No impacts would occur to Federally-listed threatened or endangered species. Impacts to State-listed species and to the species of special interest to BLM would be small.	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 Wyoming site, and the ferruginous hawk, a State-listed species in Wyoming, is reported to use the site.
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 will be small.	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.
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 will be small.	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.
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 will be small.	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.
Utilities. SMALL There may be some improvement to electrical service if upgrades are required for the proposed facility. 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 will be small.	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.

Table 7.11 (continued)

Site A in Skull Valley with a new rail line (i.e., the proposed action)	Alternative site in Wyoming[a]
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 site and would be shipped to licensed landfills or to permitted low-level waste facilities, as appropriate. Spoils resulting from construction of the proposed facility 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 will be small.	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.
Transportation and traffic. SMALL TO MODERATE. The period of greatest traffic impact would occur during the first 6–8 weeks of constructing the proposed facility, with a 130 percent 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 facility and use of the rail line for the movement of SNF would be substantially less than during construction.	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.
Economic structure. SMALL TO MODERATE (but beneficial). Constructing the proposed facility and the proposed rail line would directly result in the creation of approximately 255 jobs during the peak of construction and approximately 45 jobs during operation. 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. There should be a large benefit to the Skull Valley Band in the form of lease payments for the duration of the proposed facility's operation.	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 those 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.
Economic benefits of the proposed project include State sales tax payments, local payroll, county incentive payments, 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.

Table 7.11 (continued)

Site A in Skull Valley with a new rail line (i.e., the proposed action)	Alternative site in Wyoming[a]
Land Use	
SMALL TO MODERATE. Impacts to land use for construction of the proposed facility 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, however, could result in reduced availability of grazing resources, including access to livestock watering resources, during both construction and more particularly during operation.	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.
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 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 impacting such resources or cultural values.	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.

Table 7.11 (continued)

Site A in Skull Valley with a new rail line (i.e., the proposed action)	Alternative site in Wyoming[a]
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 facility.	The impacts to workers for a facility in Wyoming would be similar to those for a facility in Skull Valley. The primary differences would be related to a shorter length of rail line being constructed in Wyoming.
Radiological doses to members of the public. SMALL. The estimated annual dose to a hypothetical individual at the boundary of the storage area 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 (0.0356 mrem/yr).	The impacts to the public for a facility in Wyoming would be similar to those for a facility in Skull Valley. 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.
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 5 rem/yr for workers.	The impacts to workers for a facility in Wyoming would be similar to those for a facility in Skull Valley.
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 the 20-year campaign of SNF shipments to the facility. The train crew would receive a dose no greater than the equivalent of an LCF risk of 0.00976.	The annual impacts of shipping SNF by rail to the Wyoming site are estimated to be no greater than the equivalent of an LCF risk of 0.0854 for members of the public along the rail routes for the 20-year campaign of SNF shipments to the facility. The train crew would receive an annual dose no greater than the equivalent of an LCF risk of 0.00904.
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 the assumed 40-year lifetime of the proposed facility.	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 the assumed 40-year lifetime of the ISFSI.
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 risk of 0.0423 among members of the public along the rail routes for the 20-year campaign of SNF shipments to the facility.	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 risk of 0.0365 among members of the public along the rail routes for the 20-year campaign of SNF shipments to the facility.

Table 7.11 (continued)

Site A in Skull Valley with a new rail line (i.e., the proposed action)	Alternative site in Wyoming[a]
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.	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.
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 (two trains per week) the noise is not expected be annoying.	There are no discernable differences between noise impacts at the Wyoming sites and the Skull Valley sites. Noise from construction and operation would occur closer to more people at the Wyoming site, but background noise is already higher there due the greater amount of human activity and the existing rail line usage close to the alternative site.
Scenic Qualities	
MODERATE. Construction and operation would change 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.	Visual impacts for a facility in Wyoming would be similar to those of a facility in Skull Valley. Visual impacts of transportation facilities would be less for the Wyoming site because the rail line would be shorter than in Skull Valley.
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 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 or less than those at the remote Skull Valley site due to the much shorter rail line.

[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.

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

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[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

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[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
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13. INDEX

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APPENDIX A

SCOPING FOR THIS DRAFT ENVIRONMENTAL IMPACT STATEMENT

This appendix displays the two Scoping Reports—previously published by NRC—that resulted from public meetings held on this project. Each of these scoping reports summarizes the comments and concerns received by the Cooperating Agencies at the public meetings. The scope and focus of this environmental impact statement was developed in part from the comments and concerns offered at the public meetings.

The first Scoping Report, dated September 1998, was prepared following a public meeting in Salt Lake City, Utah, on June 2, 1998. The second (or supplemental) report is dated November 1999 and was prepared following public meetings in Salt Lake City and Tooele, Utah, on April 29, 1999.

DOCKET 72-22

Environmental Impact Statement Scoping Process

Scoping Report

Private Fuel Storage Facility
Skull Valley Indian Reservation, Tooele County, Utah

September 1998

U.S. Nuclear Regulatory Commission
Rockville, Maryland

DOCKET 72-22

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Skull Valley Indian Reservation, Tooele County, Utah

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CONTENTS

1. INTRODUCTION

Private Fuel Storage L.L.C. (PFS), a company owned by seven U.S. electric utilities,[1] has applied to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct and operate an independent spent fuel storage installation (ISFSI). Pursuant to the Atomic Energy Act, as amended, and the Commission's regulations in Title 10 of the *Code of Federal Regulations*, PFS filed an application (Docket No. 72-22) with an accompanying Environmental Report on June 20, 1997, for a specific license to receive, transfer, and possess nuclear power reactor spent fuel and other radioactive material associated with spent nuclear fuel (SNF) storage in an ISFSI to be constructed and operated on the Skull Valley Indian Reservation in Tooele County, Utah. The proposed facility would be located on an 820-acre site leased from the Skull Valley Band of Goshute Indians approximately 27 miles west-southwest of the city of Tooele. The proposed facility would be designed to store SNF for an initial license period of 20 years that would be subject to renewal for an additional 20 years. The applicant anticipates that by the end of the 40-year period all SNF stored at the proposed facility would have been transferred offsite, and the ISFSI site would be decommissioned.

Pursuant to its regulations in 10 CFR Part 51, the NRC is preparing an environmental impact statement (EIS) on the proposed facility as part of its decision-making process. In addition to the EIS, the NRC is preparing a Safety Evaluation Report (SER) to address safety aspects of the proposed facility.

Both the Bureau of Indian Affairs (BIA) and the Bureau of Land Management (BLM) have requested to be cooperating agencies in the preparation of the EIS. As trustees for the Skull Valley Band of the Goshute Indians, the BIA has responsibility to ensure that the interests of the tribe are not compromised by construction and operation of the proposed ISFSI. As manager of the Federal land adjacent to the proposed facility and over which rail access to the site might be built, the BLM has responsibility to represent the interests of the United States with regard to these lands.

The proposed facility would store SNF inside sealed canisters, which are enclosed in steel and concrete casks that provide shielding and additional mechanical protection to the fuel. The canister/cask-based system confines radioactive wastes and would be licensed by NRC in accordance with 10 CFR Part 72 requirements for storage of SNF. The proposed facility would store up to 40,000 metric tons of uranium (MTU) in a maximum of 4,000 casks. PFS proposes to begin construction of the facility in 2000 and to complete Phase 1 construction by the end of 2001. This phase of construction will provide an operational facility. Ownership and ultimate responsibility for the SNF would continue to remain with the utilities that generated it until such time as the fuel is transferred to the U.S. Department of Energy (DOE).

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[1]As per p. 1-10 of the PFS License Application, the members of the limited liability company are Genoa FuelTech, Inc., Indiana Michigan Power, Consolidated Edison Company of New York, GPU Nuclear Corporation, Northern States Power Company, Illinois Power Company, and Southern Nuclear Operating Company.

The scoping process was initiated on May 1, 1998, with the publication in the *Federal Register* of a Notice of Intent (NOI) to prepare an EIS and conduct the scoping process (63 *Fed. Reg.* 24197–98). As described in the NOI, the objectives of the scoping process are to

1. define the scope of the proposed action which is to be the subject of the EIS;
2. determine the scope of the EIS and identify significant issues to be analyzed in depth;
3. identify and eliminate from detailed study issues which are peripheral or are not significant;
4. identify any environmental assessments and other EISs which are being or will be prepared that are related to but not part of the scope of the EIS under consideration
5. identify other environmental review and consultation requirements related to the proposed action;
6. indicate the relationship between the timing of the environmental analyses and the Commission's tentative planning and decision-making schedule;
7. identify any cooperating agencies and, as appropriate, allocate assignments for preparation and schedules for completion of the EIS to the NRC and any cooperating agencies; and
8 describe the means by which the EIS will be prepared, including any contractor assistance to be used.

This report has been prepared to summarize the determinations and conclusions reached in the scoping process. Individuals and organizations who provided comments during the scoping period will receive a copy of this report. Following the publication of this report, the NRC staff will commence preparing a draft EIS. Oak Ridge National Laboratory is the contractor selected by NRC to provide technical assistance in the preparation of the EIS.

After publication of the draft EIS, the public will be invited to comment on that document. After evaluating comments on the draft EIS, NRC will issue a final EIS that will serve as the basis for the Commission's consideration of environmental impacts in its decision on licensing the proposed ISFSI and for issuance of decisions by cooperating agencies with authorizing actions. Section 2 of this report summarizes the comments and concerns expressed by government officials, agencies, and the public. Section 3 identifies the issues that the EIS will address and those issues that are not within the scope of the EIS. Where appropriate, Section 3 identifies other places in the decision-making process where issues that are outside the scope of the EIS may be considered.

2. SUMMARY OF ISSUES RAISED DURING THE SCOPING PROCESS

2.1 OVERVIEW

NRC held the Public Scoping Meeting for the EIS regarding the proposed ISFSI in Skull Valley, Utah, on June 2, 1998, in Salt Lake City. During the scoping meeting, 35 individuals offered comments about the proposed action. Of these 35 speakers, 3 were representing Federal agencies or organizations, 9 were representing State of Utah agencies or departments, and 23 spoke on behalf of other organizations or as private citizens. In addition, 30 written statements from individuals, organizations, and agencies were received during the scoping period. Some of these submittals were written statements or summaries of the verbal testimony. This active participation by the public in the scoping process is an important component of determining the major issues that the EIS should assess.

The individuals at the meeting offered comments and questions on several subject areas but primarily emphasized their concerns about risk and safety issues (e.g., transporting spent fuel and the potential for accidents during storage), the role of the Utah State government, and environmental impacts resulting from the construction and operation of the proposed facility. The comments and questions have been initially categorized into the following general topics:

- accidents;
- transportation of spent fuel;
- cumulative impacts and scope of the analysis;
- compliance with applicable local, State, and Federal regulations;
- geology and seismicity;
- hydrology (surface water and groundwater);
- socioeconomics (including land use, aesthetics, recreational resources and cost/benefit analyses);
- ecology;
- cultural resources and environmental justice;
- need for the facility;
- radiological impacts and human health and safety;
- emergency preparedness;
- decommissioning;
- long-term storage of spent fuel; and
- alternatives.

Attachment A to this report lists the commentors and, on the basis of the topics listed above, shows the subject areas covered by their comments. Attachment B contains a proposed outline for the draft EIS, which was developed after considering the oral and written scoping comments.

In addition to raising important issues about the potential environmental impacts of the proposed facility, some commentors offered opinions and concerns that typically would not be included in the subject matter of an EIS—these include, for example, general opinions about nuclear energy policy in the United States or issues that are more appropriately considered in the NRC's SER. Comments of this type are taken into consideration by the staff, but they do not point to significant environmental issues to be analyzed. Such comments are categorized here as "out of scope." Other statements may be relevant to the proposed action, but they have no direct bearing on the evaluation of alternatives or on the decision-making process involving the proposed action. For instance, general statements of support for or opposition to the proposed project fall into this category. Again, comments of this type have been noted but are not used in defining the scope and content of the EIS.

Section 2.2 summarizes the issues raised during the scoping process, many of which the staff has identified as having a direct bearing on the analysis of potential environmental impacts and the NRC's related decision-making process. Section 2.3 briefly describes other sources of project-related information that were considered during the scoping process for the EIS.

2.2 SUMMARY OF ISSUES RAISED

2.2.1 Accidents

A common concern expressed pertaining to the proposed project is the potential for accidents. Of particular concern are accidents that would involve a significant radiological release that, in turn, could have serious human health, social, ecological, and economic impacts. Many commentors were concerned that such accidents could occur in the facility itself, during transport of spent fuel, in the Intermodal Transfer Facility (ITF) which would be located about 24 miles from the proposed facility, and while casks are being handled by various types of equipment.

Several commentors were concerned about cask testing, performance, and degradation, especially the potential for leaks, loss of containment, loss of helium from the canisters, and cask overheating. Natural phenomena (such as earthquakes, floods, and brush fires) and external events (such as plane crashes) were also believed to be capable of causing catastrophic accidents involving radiological releases. The lack of a hot cell in the facility and the potential for human error were seen as increasing the potential for accidents.

The threat of sabotage, either by an insider or by terrorists, was regarded as an important vulnerability of the facility and of transportation activities; and several commentors pointed out that the population of the region around the proposed project is expected to increase, potentially making the consequences of an accident more serious. Some commentors expressed concern that the proposed project itself may cause accidents that would affect other resources and create hazards for the public, such as the ignition of wildfires by the proposed railroad and the resultant hazards to fire fighters.

Many commentors felt that accident analysis should be broadly extended to cover all components of transporting and storing the spent fuel and that the analysis should be based upon accurate, reliable, and objective data and previous studies. A few commentors felt that new tests should be performed to ensure the reliability of the casks. Mitigation plans for accident consequences and considerations of the potentially significant costs of an accident were also seen as related to the environmental impact analysis for the facility.

2.2.2 Transportation of Spent Fuel

Many commentors were concerned about the number, type, and frequency of spent fuel shipments; and there were several comments about the large quantity of spent fuel to be shipped and stored. These commentors felt that the transport of high-level nuclear waste carries many environmental and economic risks that have not been adequately evaluated in the site-specific context of the proposed action.

One commentor noted that transportation accidents—even those that do not involve a radiological release—may disrupt and adversely affect vital transportation routes in the region, resulting in attendant economic impacts. Other commentors mentioned that (1) DOE will be using the same transportation corridor for nuclear waste shipments, (2) Utah State legislation (HR 2083 and SB 196) may impose prohibitively high fees on transporting spent fuel within the State, and (3) public health resources would have to be used to inform affected members of the public who perceive that they are in danger from the shipments.

One commentor said that an accident involving spent fuel near the Great Salt Lake could result in serious impacts to wildlife. Some commentors indicated that all communities along transport corridors would be endangered and, further, that they may not have adequate emergency response capabilities. Commentors also felt that there were insufficient safeguards in place to prevent or mitigate accidents and to protect shipments from potential sabotage.

In addition, commentors felt that the EIS should evaluate the transportation of spent fuel comprehensively—that is, from the originating nuclear power plant to the proposed facility, by both truck and rail shipments, and in terms of the full range of potential impacts associated with transporting spent fuel. Of particular concern were the potential impacts on the public and on the emergency response capabilities in communities located along the transport corridors.

2.2.3 Cumulative Impacts and Scope of the Analysis

Commentors noted that the proposed site is located in an area of military, chemical-industrial, and waste disposal facilities, such as Dugway Proving Grounds, the Tooele chemical weapons depot, and a magnesium refining operation. Consequently, they felt that the proposed facility should be evaluated in the context of the collective, interrelated, and cumulative impacts of these facilities, especially because of accidents that have already occurred in the area and because of past and ongoing environmental insults and contamination.

Commentors suggested that the potential for accidents at the proposed site would be heightened by the proximity of the other hazardous facilities and by the presence of an Air Force base that performs low-altitude flights. A few commentors reported that residents of the area already have experienced increased risk and incidence rates for serious illnesses as a result of contamination and emissions from the nearby facilities and from nuclear weapons tests in that area in the 1950s. Some commentors argued that the impact assessment should include a large region around the proposed site because of the presence of other potentially hazardous facilities.

2.2.4 Compliance with Applicable Local, State, and Federal Regulations

Many commentors raised legal and regulatory questions regarding the proposed project. Some of those issues fall outside the scope of the EIS, such as DOE's statutory responsibilities regarding spent fuel management and transportation, contractual liabilities and responsibilities of the Skull Valley Band, the terms of the lease agreement with Band members, Tribal sovereignty laws, and the actions and responsibilities of BIA.

Some commentors felt that the proposed project should comply with all provisions of the Nuclear Waste Policy Act, and a few commentors felt that existing NRC regulations regarding the transportation of spent fuel and the operation of spent fuel storage facilities are inadequate to ensure the public safety. Commentors also pointed to legal and regulatory compliance issues that would be relevant to the proposed facility under the NEPA process. In particular, these include the need to comply with all applicable Federal, State, and local regulations covering environmental resources such as groundwater, air quality, effluents, waste, wetlands, and water and storm discharges.

Other commentors were concerned that construction and transportation activities associated with the proposed project would infringe on rights-of-way or trust lands owned by the State of Utah or by private citizens. Two commentors mentioned water rights as an issue that may affect the availability of any potable or process water required for the facility. One commentor said that relevant legislation, regulations, entitlements, and permits enacted or required by the State of Utah should be reviewed in detail and that the status of compliance with those requirements should be described.

A representative from BLM asked if that agency should be included as a cooperating agency in the preparation of the EIS and mentioned its potential role in key decisions about permits and other authorizations. Some commentors felt that NEPA regulations regarding scoping would require NRC to extend the comment period because the PFS application lacks sufficient detail. Another commentor mentioned that any existing or potential oil, mineral, or natural gas leases in the area should be identified and evaluated for their effect on the proposed project. One commentor stated that BIA should prepare an independent EIS regarding the lease agreement between the applicant and the Skull Valley Band of Goshutes.

2.2.5 Geology and Seismicity

Several commentors regarded geology and seismicity at the proposed site as critically important issues affecting the suitability of Skull Valley to host a spent nuclear fuel storage facility. The geologic conditions mentioned most often include the potential for large-magnitude earthquakes, ground motion, soil stability, and surface rupturing.

Commentors felt that the potential for earthquakes and ground motions in the area may be greater than the applicant has reported and that a more complete analysis of the faults and other geologic structures in the area is needed. One commentor, for example, recommended that PFS be required to collect data from a statewide strong-motion seismic information network for use in design and planning of the proposed facility. Other commentors felt that the design of the proposed facility and the casks is sufficient to prevent damage to or releases from the spent fuel in the event of a large earthquake.

2.2.6 Hydrology (Surface Water and Groundwater)

Several commentors felt that the effects of construction and operation of the proposed project on surface water and groundwater resources should be assessed in detail for both the site itself and the larger region around it. In addition, some commentors felt that the facility—during both routine and accident conditions—has the potential to contaminate water resources. One commentor stated that existing water supplies are "dirty," and several others mentioned the issue of water rights and availability.

Other issues mentioned by commentors include the probable maximum flood (PMF), facility water usage requirements, water availability, effects on the water table and aquifer, and impacts on other water uses and users in the area. One commentor disagreed with the PMF calculation in the license application, saying that the drainage basin described by the applicant as 26 square miles in area is actually closer to 240 square miles. The same commentor noted that floods have occurred in the area and that during those floods, the land depressions south of the access road were filled, the ground was saturated, and much of Skull Valley produced significant amounts of runoff.

2.2.7 Socioeconomics

Some commentors acknowledged that the proposed project may have positive economic effects on the resident Tribal population, but they also expressed concerns about allowing these positive effects to overshadow the negative social and economic consequences of the proposed action. Socioeconomic issues mentioned include effects of the proposed facility on (1) nearby property values, (2) the local tax base, (3) residential and commercial development in the region, (4) agriculture, (5) beef production, and (6) regional employment. A few commentors suggested that the mere presence of the facility may induce these adverse socioeconomic impacts because of the negative public perceptions that are attached to nuclear waste storage.

Some commentors were particularly concerned about the costs associated with accidents at the facility and the economic burdens that could be placed on the Tribe or the State if costly cleanup activities were required. Other commentors felt that there are too many unknowns in the potential costs of the project to allow for an accurate cost determination, and one commentor said that the cost/benefit analysis must thoroughly evaluate the cost and risks of the proposed project in comparison with the costs of storing the spent fuel at the nuclear power plants. One commentor suggested that financial assistance should be given to affected communities to mitigate potential economic impacts of the proposed facility.

Although the proposed project may induce positive socioeconomic impacts, some commentors were concerned that those economic benefits would not be distributed fairly, would be inadequate compensation for the degree of risk involved, and would be insufficient to cover any costs the Tribe may incur as a result of hosting the proposed facility.

Some commentors stated that the cost/benefit analysis should cover the life of the project and should include the cost of on-site storage at the power plants, the specifics of State-imposed restrictions, the costs of transportation, and the specific costs of all phases of the project, including decommissioning. One commentor stated that the cost/benefit analysis should include an evaluation of the financial impact of the proposed project on ratepayers at the PFS member utilities.

A few commentors were concerned about the effect of the proposed project on land use and values in the area, particularly public lands (such as State-administered Trust lands) and rights-of-way, that may be disturbed or degraded during construction and operation of the facility and during transportation activities. Others noted that the proposed project may alter the land use patterns of the area and set an undesirable precedent for future land use. Also, commentors mentioned livestock grazing and the extensive agricultural and ranch lands in the vicinity and were concerned about potential adverse impacts on these resources. Some commentors felt that the proposed project would interfere with future land use and development in the area.

Several commentors noted that Skull Valley is a valuable and attractive ecosystem that is too often inaccurately described as "barren." These commentors see the wildlife and vegetation in the region as valuable resources that must be preserved and protected for the enjoyment of current and future residents and visitors.

Similarly, some commentors were concerned about the effects of the proposed facility on recreational resources and tourism. Nearby wilderness areas and historic sites and trails, for example, have recreational value; and the Valley is an educational resource for wildlife observation, including the study of raptors.

2.2.8 Ecology

Commentors expressed several concerns about the impacts of all phases of the proposed project on plant and animal species of the region. One commentor said that some mitigation measures being discussed could possibly minimize those impacts but felt that a greater effort should be made to identify and address unintended impacts on wildlife migration patterns, critical habitats, and the potential for unavoidable impacts on wildlife and its habitat.

One commentor suggested that the EIS include an assessment of the proposed facility's effects on wetlands and the grazing patterns of domestic livestock. The commentor further expressed concern about the potential impacts of toxic spills or other environmental contamination of the Great Salt Lake, which he said is a unique ecosystem of international importance. The commentor noted that the lake has been designated as a western hemispheric shore bird reserve because of its importance to migratory wildlife and that it supports brine shrimp harvest and mineral extraction industries that are important to the State's economy. Two other sites near the proposed facility were also mentioned as ecologically significant areas (Timpie Springs and Horseshoe Springs) because of their importance to migratory birds and other wildlife that use these isolated areas. Commentors further mentioned that the project may impact threatened, endangered, or other special status species such as the bald eagle, peregrine falcon, and Pohl's Milkvetch. Another commentor asked that the EIS evaluate potential impacts on wild horses.

One commentor suggested that rabbits and pigeons should be prevented from getting near the casks because of the potential for impacts from repeated low-level exposures; and one commentor was concerned about the potential for bioaccumulation of radionuclides in raptors from accidental contamination of their prey. The commentor stated that rodent and insect barriers may be needed for the casks. Some commentors felt that the impacts of the project may extend well beyond the boundaries of the site itself and that the EIS should evaluate potential impacts to natural resources throughout northern Utah.

2.2.9 Cultural Resources and Environmental Justice

Some commentors indicated that the proposed project may have adverse and unacceptable impacts on the historic and archaeological resources and heritage of the area. They felt that a full analysis of those potential impacts should be included in the EIS. Several commentors pointed to the cultural traditions and lifestyle of the resident Native Americans and were concerned that the proposed project might disrupt the practice and enjoyment of that lifestyle. These commentors felt that Native American reservations have been disproportionately used as sites for hazardous and toxic waste storage or disposal. A few commentors noted that the proposed project has caused social rifts among Tribal members.

Citing Executive Order 12898, some commentors mentioned environmental justice issues and said that most of the impacts of the proposed project would fall on a minority population that already experiences increased environmental and health risks from several nearby hazardous facilities. Some commentors suggested that the presence of the proposed facility, the transport of nuclear fuel, and the potential for accidents may induce fears and a loss of the sense of well-being among residents, impinge on and diminish the value of ancestral or sacred land, and affect residents' attitude toward their community and lands. They indicated that these impacts may be felt both individually and collectively for the resident population. Other commentors were concerned that the economic benefits of the proposed project might not be distributed fairly among the resident Native Americans. Furthermore, the commentors suggested that emergency planning programs for transportation and operation should specifically consider the needs and characteristics of the Native American population.

2.2.10 Need for the Facility

The need for the facility was questioned by several commentors. For instance, it was felt that many nuclear power plants have the capability to store the spent fuel they generate and that an analysis of the need for the facility should therefore include current and projected quantities of spent fuel and storage capacity at those plants.

Commentors further suggested that the assessment of the need for the Skull Valley facility must consider that need on a national level, must be consistent with current national nuclear waste policy and legislation, and should not be used to divert national attention and policy away from more suitable locations. Some commentors also felt that the need for the facility is being evaluated only for temporary storage when it may become a permanent facility if no suitable repositories are available at the end of the facility's license.

2.2.11 Radiological Impacts and Human Health and Safety

The dominant human health and safety concern expressed by commentors was the potential for exposure to radiation. They noted that exposures to both workers and the public could occur during transport of nuclear fuel, after an accident, and during routine operations and maintenance; and they felt that comprehensive dose assessments should be conducted. The commentors also felt that the health effects of accidental releases would be very serious. Potential adverse effects on the mental health of residents and on people exposed to radiation in an accident were also mentioned; one commentor was concerned that the perception of risk could cause adverse impacts on a population. Other commentors said that the EIS should analyze health risks in the context of the ongoing risks from the nearby chemical and hazardous waste facilities—some commentors felt that many residents of the region have already experienced significant health problems because of those facilities and existing contamination in the area. Commentors also felt that the public health and safety resources of the State would be overburdened if they must be used to address the real and perceived risks of the facility. One commentor stated that quantitative and qualitative health and ecological risk assessments should be provided. Another commentor suggested that rain and melted snow may become radiologically contaminated on the concrete pads.

2.2.12 Emergency Preparedness

Several commentors noted that the inherent hazards of spent nuclear fuel and the potentially serious consequences of a catastrophic accident should make emergency preparedness issues a consideration in the EIS. They stated that a specific, detailed emergency response plan should be prepared; that it should be coordinated, reviewed, and approved by relevant local, State, and Federal organizations; that it should describe the on- and off-site emergency response capabilities; and that it should not be limited only to Skull Valley or Tooele County.

Some commentors indicated that emergency response planning should cover all transportation corridors and all elements of emergency preparedness such as facilities, equipment, infrastructure, response capabilities, monitoring, warning and notification systems, personnel training, cumulative impacts, mitigation, and relevant NWPA provisions. Two commentors felt that the emergency planning for the proposed facility should be modeled after the U.S. Army's Chemical Stockpile Emergency Preparedness Program, particularly its emphasis on effective coordination, consultation, and agreement with State agencies. One commentor suggested that financial assistance may be needed in at-risk communities. Specific concerns mentioned by one commentor include (1) wildfires, (2) snow buildup around casks, (3) excessive heat and cold, (4) accident response times, and (5) impacts of being unable to repackage a damaged cask.

2.2.13 Decommissioning

Some commentors felt that decommissioning of the proposed facility may be difficult and costly, particularly if any accidents occurred during the license term. These commentors expressed uncertainties about the ability and willingness of the applicant's member utilities to provide sufficient funds for decommissioning. They further stated that the financial viability and responsibilities of the member utilities may be difficult to assess and that individual member utilities may elect to withdraw from PFS, thereby complicating the question of funding for decommissioning.

2.2.14 Long-term Storage

Several commentors were concerned that the proposed project is being planned as an interim storage facility but may become a permanent storage facility. They cited, as an example, the current unavailability of the Yucca Mountain site, the uncertain schedule for opening that site, and the potential legal, regulatory, and social opposition that may arise if other sites are proposed. In general, these commentors felt that the proposed facility will be forced to store spent fuel past the license term or will become attractive as a permanent storage site if very few alternatives are available. Because of these concerns, the commentors stated that the analysis of environmental impacts in the EIS should include the possibility of long-term or even permanent storage of spent fuel in the proposed facility.

2.2.15 Alternatives

Some commentors said that the no-action alternative should be covered in detail, including the economic and environmental benefits of leaving spent fuel stored on-site at the originating nuclear power plants. One commentor mentioned that the evaluation of alternatives should include all the technological concerns raised by the State of Utah about the proposed facility. Another commentor felt that the potential environmental justice impacts of the proposed facility could possibly be mitigated by the selection of an alternative site. Some commentors stated that other sites may be more suitable locations for spent fuel storage if a permanent repository is not available at the end of the proposed facility's license term. A few commentors suggested that other locations, including regional private ISFSIs, may be more suitable for a spent fuel storage facility. One commentor said that the applicant's Environmental Report lists 38 potential sites and that the EIS should evaluate each of these sites. The commentor also mentioned that alternative transportation routes should be evaluated in the EIS. Lastly, some commentors felt that the analysis of alternatives should acknowledge the possibility that other facilities may not be available to receive damaged canisters if PFS is required to ship such items off-site or when the license term expires.

2.3 OTHER SOURCES OF SCOPING-RELATED INFORMATION

The comments from the public scoping meeting, as well as the written comments received within the scoping period, were used to help NRC define the issues and alternatives to be addressed in the EIS. As part of determining the scope of the draft EIS, the NRC staff has also reviewed its regulations and generic guidance documents relevant to the preparation of the EIS, as well as many of the documents that were submitted as part of the licensing process for this facility, as appropriate. Some of these documents, although not summarized here, present issues and alternatives that helped to refine the scope of the EIS.

3. SUMMARY AND CONCLUSIONS

3.1 SCOPE OF THE EIS

To a large extent, the general content of an EIS prepared by NRC is prescribed by NEPA (Public Law 91-90, as amended), NRC's regulations for compliance with NEPA (10 CFR Part 51), and guidance provided by the Council on Environmental Quality regulations (40 CFR Parts 1500–08). These regulations broadly define the areas that must be considered in the assessment of potential impacts resulting from a proposed action. In conjunction with these regulatory guidelines, the scoping process summarized in this report helped to identify and refine the project-specific issues that warrant consideration in the EIS.

The EIS will include a cost/benefit analysis that summarizes the environmental and other costs and benefits of the proposed action. On the basis of the regulations and the scoping process, NRC has initially determined that the EIS will assess the potential environmental impacts of the proposed facility, for both construction and operation activities, in the following subject areas, as supplemented by the areas identified in Attachment B:

- ***Radiological impacts and human health and safety.*** The potential public health consequences of the proposed facility will be evaluated primarily in terms of radiological exposure risk during normal operations (including handling, transfer, and inspection activities) and under credible accident scenarios. Nonradiological events and activities with potential human health impacts will also be identified and evaluated.
- ***Cumulative impacts.*** The EIS will analyze the potential cumulative impacts, if any, of the proposed facility in the context of other existing and proposed facilities and activities in the area of the proposed site, as appropriate.
- ***Socioeconomics.*** The socioeconomic issues that fall within the scope of the EIS include the direct and indirect economic effects (both beneficial and adverse) on employment, taxes, property values, residential and commercial development, agriculture, and public services in the area. The EIS will include an economic cost/benefit analysis. The effects of the proposed project on land use in the area, including public lands and rights-of-way, will be assessed in the EIS, including an evaluation of the extent to which lands and land use may be disturbed or altered during construction and operation of the proposed facility. In addition, recreational and tourism sites, wilderness areas, and aesthetic values of the area will be analyzed.
- ***Cultural resources and environmental justice.*** The EIS will assess potential impacts of the proposed project on the historic and archaeological resources of the area and on the cultural traditions and lifestyle of Native Americans. Environmental justice impacts will receive attention because of the location of the proposed facility on Reservation lands.
- ***Geology and seismicity.*** The EIS will describe the geologic and seismic characteristics of the proposed site. Evaluation of the potential for earthquakes, ground motion, soil stability concerns, surface rupturing, and any other major geologic or seismic considerations that would affect the suitability of the proposed site as a storage location for SNF will be addressed in the SER rather than the EIS; the SER will also address cask design, particularly in the context of potential seismic events.
- ***Transportation.*** The analysis of potential impacts resulting from the transportation of spent fuel will consider relevant aspects of both rail and truck transport of SNF to the proposed facility.

The EIS will discuss the number, type, and frequency of shipments, as well as routing considerations and the quantities of spent fuel being shipped. The impacts of transportation will be evaluated primarily in terms of radiological exposure risk during normal transportation (including handling, transfer, and inspection) and under credible accident scenarios. The nonradiological impacts of transportation will also be identified and evaluated. Construction activities required for road or rail systems will be assessed, including input from BIA and BLM.

- ***Accidents.*** The SER will assess the environmental impacts associated with credible accidents at the proposed facility, both from natural events and human activities. (NRC regulations and guidance specify that the facility be designed to withstand various natural events without having a significant radiological release). The EIS will analyze the potential environmental impacts resulting from credible accidents at the proposed facility.
- ***Compliance with applicable regulations.*** The EIS will present a listing of the relevant permits and regulations that are believed to apply to the proposed facility. Regulatory or legal issues that will be covered in the EIS include water rights, land use restrictions such as rights-of-way, and oil, gas, or mineral leases that would interfere with the availability or suitability of the proposed site.
- ***Air quality.*** Potential air quality impacts of the proposed project will be evaluated in the EIS. The evaluation will include potential impacts resulting from construction activities and operation and will compare the anticipated air quality impacts, if any, with relevant standards. If appropriate, modeling will be performed to assist in the analysis of potential air quality impacts.
- ***Hydrology.*** The EIS will assess the potential impacts of the proposed project on surface water and groundwater resources. The assessment will consider water resources, water quality, water use, floodplains, and the probable maximum flood.
- ***Ecological resources.*** The EIS will assess the potential environmental impacts of the proposed facility on ecological resources, including plant and animal species and threatened or endangered species or critical habitat that may occur in the area. As appropriate, the assessment will include potential effects on wildlife migration patterns; and mitigation measures to address adverse impacts will be analyzed.
- ***Need for the facility.*** A discussion of the need for the proposed facility and the expected benefits will be presented in the EIS and will include an estimate of the amounts of spent fuel generated by participating nuclear power plants and the utilities' capabilities to store that fuel.
- ***Decommissioning.*** The EIS will include a general discussion of decommissioning of the facility and associated impacts.
- ***Alternatives.*** The no-action alternative and other reasonable alternatives to the proposed action will be described and assessed in the EIS. Other reasonable alternatives to the proposed action, such as alternative sites or alternative storage methods, will be considered.

3.2 ISSUES OUTSIDE THE SCOPE OF THE EIS

The purpose of an EIS is to assess the potential environmental impacts of a proposed action as part of the decision-making process of an agency—in this case, a licensing decision. As noted in Sect. 2.1, some issues and concerns raised during the scoping process are not relevant to the EIS because they are not directly related to the assessment of potential impacts or to the decision-making process. Exclusion from the EIS, however, does not suggest that an issue or concern lacks value. Issues beyond the scope of an EIS may be appropriately discussed and decided in other venues.

Some of the issues raised during the public scoping will not be addressed in the EIS. These include legal issues such as the potential conflict between Federal laws regarding Tribal sovereignty and State laws regarding waste storage. An analysis of DOE's statutory responsibilities regarding SNF, particularly as legislated in the Nuclear Waste Policy Act, is also outside the scope of the EIS; and DOE's responsibilities regarding SNF do not require that DOE be a cooperating agency for this EIS. Similarly, DOE's activities at Yucca Mountain and questions about the future availability of that site are beyond the scope of the EIS, as is the potential that such a facility may not become available within the next 40 years [see 10 CFR § 51.23(b)]. Other issues that will not be evaluated in the EIS include requests to extend the scoping period in response to revised licensing-related submittals by the applicant and conducting separate scoping processes for BIA and BLM.

Some issues raised during the public scoping process for the proposed facility are outside the scope of the EIS, but they will be analyzed in the SER. The EIS and the SER are related in that they may cover the same topics and may contain similar information, but the analysis in the EIS is limited to an assessment of potential environmental impacts. In contrast, the SER primarily deals with safety evaluations and procedural requirements or license conditions to ensure the health and safety of workers and the general public. The SER also covers other aspects of the proposed action such as demonstrating that the applicant will provide adequate funding for decommissioning of the facility (in compliance with NRC financial assurance regulations) and that the site-specific emergency preparedness procedures are appropriate. Also, the design of the transport, transfer, and storage casks will be evaluated in the SER or in separate rulemaking proceedings for conformity with NRC regulations regarding safety and testing. The SER will include an evaluation of the safeguards at the proposed facility (pursuant to 10 CFR Part 73).

Attachment A

Comment Subject Areas by Commentor, Oral and Written Comments

Attachment A. Comment subject areas by commentor, oral and written comments[a]

Commentor and affiliation (if any)	Safety and accidents	Transportation	Cumulative impacts and EIS scope	Regulatory compliance	Geology and seismicity	Hydrology	Socioeconomics	Ecology	Cultural resources and environmental justice	Need for the facility	Radiological impacts and human health	Emergency preparedness	Decommissioning	Long-term storage	Alternatives
Oral comments															
Lee Allison, Utah Geological Survey	√				√										
Calvin Andrews, Analogics Marketing and Consulting	√	√	√		√		√	√	√		√			√	
Wayne Ball, Utah Department of Health	√	√	√				√				√				
Steven Barrowes, Scientists for Secure Waste Storage	√	√			√	√		√			√	√			
Leon Bear, Chairman, Skull Valley Band of the Goshute Indians		√	√	√			√								
Ralph Becker, Utah House of Representatives	√	√	√	√							√			√	√
Lisa Bullcreek, member, Skull Valley Goshutes	√					√	√	√	√						
Margene Bullcreek, Ohngo Gaudadeh Devia Awareness	√	√	√			√	√	√	√		√				
Chris Cernich, Utah Department of Agriculture and Foods	√						√	√			√				

Attachment A (continued)

Commentor and affiliation (if any)	Safety and accidents	Transportation	Cumulative impacts and EIS scope	Regulatory compliance	Geology and seismicity	Hydrology	Socioeconomics	Ecology	Cultural resources and environmental justice	Need for the facility	Radiological impacts and human health	Emergency preparedness	Decommissioning	Long-term storage	Alternatives
Kathleen Clark, Utah Department of Natural Resources	✓	✓	✓	✓		✓	✓	✓							
Donald Cobb, Utah Department of Public Safety	✓	✓										✓			
Merrill Cook, U.S. House of Representatives	✓	✓	✓	✓	✓		✓							✓	✓
Cynthia of the Desert	✓	✓	✓		✓	✓			✓		✓	✓			✓
Nina Dougherty, Sierra Club, Utah Chapter	✓	✓	✓		✓		✓	✓	✓		✓				✓
Ferris Groll, Utah Department of Public Safety	✓	✓					✓								
R. J. Hoffman	✓		✓							✓	✓				✓
Steve Hoffman, Hawk Watch International		✓					✓	✓							
Rosemary Holt, Women Concerned/Utahns United	✓	✓	✓											✓	✓
Martin Huebner, Coalition 21			✓												

Attachment A (continued)

Commentor and affiliation (if any)	Safety and accidents	Transportation	Cumulative impacts and EIS scope	Regulatory compliance	Geology and seismicity	Hydrology	Socioeconomics	Ecology	Cultural resources and environmental justice	Need for the facility	Radiological impacts and human health	Emergency preparedness	Decommissioning	Long-term storage	Alternatives
Jonathan Hurd, Salt Lake Food Not Bombs			✓				✓				✓				
Bob James, Hill Air Force Base	✓														
Virgil Johnson, member Goshute Tribe (Ibapah)	✓						✓		✓						
John Paul Kennedy, general counsel for the Confederated Tribes of the Goshute Reservation				✓			✓		✓		✓		✓		✓
Stephanie Kessler, Wyoming Outdoor Council	✓	✓	✓	✓			✓			✓		✓		✓	✓
Michael O. Leavitt, Governor, State of Utah	✓	✓	✓	✓			✓				✓			✓	✓
Brian Meacham, Utah Peace Test	✓	✓	✓		✓										✓
Dianne Nelson, Utah Department of Environmental Quality	✓	✓	✓	✓			✓		✓		✓	✓			✓
William D. Peterson, P&A Engineers	✓										✓				

Attachment A (continued)

Commentor and affiliation (if any)	Safety and accidents	Transportation	Cumulative impacts and EIS scope	Regulatory compliance	Geology and seismicity	Hydrology	Socioeconomics	Ecology	Cultural resources and environmental justice	Need for the facility	Radiological impacts and human health	Emergency preparedness	Decommissioning	Long-term storage	Alternatives
Bonnie Robinson	√	√									√				
Christopher Robinson, Skull Valley Co., Ltd.; Castle Rock Land & Livestock, L.C.; and Ensign Ranches of Utah, L.C.	√	√				√	√	√			√			√	√
Jerry Schmidt	√	√			√		√		√		√				
David Terry, School and Institutional Trust Lands Administration, State of Utah							√								
Gregory Thayn, Bureau of Land Management, Utah State Office		√	√	√				√	√						
Chip Ward, West Desert HEAL	√	√	√				√	√			√				
Suzanne Winters, Utah State Science Advisor	√	√		√								√			
Written comments															
Agency for Nuclear Projects, State of Nevada (Robert R. Loux)		√													
Myron and Lois Armstrong			√								√				√

Attachment A (continued)

Commentor and affiliation (if any)	Safety and accidents	Transportation	Cumulative impacts and EIS scope	Regulatory compliance	Geology and seismicity	Hydrology	Socioeconomics	Ecology	Cultural resources and environmental justice	Need for the facility	Radiological impacts and human health	Emergency preparedness	Decommissioning	Long-term storage	Alternatives
Bureau of Land Management (U.S. Department of the Interior) Utah State Office (G. William Lamb)	✓	✓	✓				✓	✓	✓	✓	✓	✓		✓	
Coalition 21 (M. F. Huebner)			✓												
Merrill Cook, U.S. Congress	✓	✓	✓	✓	✓									✓	✓
Department of the Air Force (E. Allan Dalpias)	✓						✓								
Downwinders, Inc. (S. Erickson)	✓		✓	✓	✓				✓		✓	✓			✓
Dolores K. Gurr	✓				✓						✓				
Land and Water Fund, for L. Bullcreek, M. Bulcreek & OGD (R. E. Condit and J. Walker)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Michael O. Leavitt, Governor, State of Utah		✓	✓				✓							✓	✓
Nuclear Information and Resource Service (Mary Olson)	✓	✓	✓	✓			✓		✓		✓			✓	✓
P&A Engineers (William D. Peterson)	✓														

Attachment A (continued)

Commentor and affiliation (if any)	Safety and accidents	Transportation	Cumulative impacts and EIS scope	Regulatory compliance	Geology and seismicity	Hydrology	Socioeconomics	Ecology	Cultural resources and environmental justice	Need for the facility	Radiological impacts and human health	Emergency preparedness	Decommissioning	Long-term storage	Alternatives
Parr Waddoups Brown Gee & Loveless, for Castle Rock (B. T. Allen)		✓	✓			✓	✓	✓							✓
Fae Picklesimer															✓
Public Citizen Critical Mass Energy Project, et al. (M. Olson, A. Piersma, D. Kraft, C. Williams, D. Katz)				✓						✓					
Donald J. Ravas	✓				✓						✓				
Sierra Club, Utah Chapter (C. King)	✓	✓			✓		✓		✓		✓				
Skull Valley Band of Goshute Indians (L. Bear)							✓		✓						
State of Utah, Department of Environmental Quality (D. R. Nielson)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Doug Tanner								✓	✓						
Utah Farm Bureau Federation (C. B. Wallentine)	✓			✓		✓	✓	✓							

Attachment A (continued)

Commentor and affiliation (if any)	Safety and accidents	Transportation	Cumulative impacts and EIS scope	Regulatory compliance	Geology and seismicity	Hydrology	Socioeconomics	Ecology	Cultural resources and environmental justice	Need for the facility	Radiological impacts and human health	Emergency preparedness	Decommissioning	Long-term storage	Alternatives
Utah Peace Test (B. Meacham)	√	√	√		√										√
Carol Werner	√				√	√	√							√	√
West Desert HEAL et al. (C. Ward)	√	√	√				√	√			√				
Western Interstate Energy Board (K. Niles and A. Turner)		√													
Delbert Williams		√	√												√
Morrie Wills	√		√			√	√	√	√		√		√	√	√
Women Concerned/Utahns United (R. A. Holt)	√	√												√	√
N. Woodmansee	√														√
Wyoming Outdoor Council (S. Kessler)	√	√	√	√			√			√		√		√	√

[a]Some commentors gave oral and written comments and are therefore listed twice in the table.

Attachment B

Proposed Outline for the Draft Environmental Impact Statement

PROPOSED OUTLINE OF THE DRAFT EIS CONTENTS

PRIVATE FUEL STORAGE FACILITY, SKULL VALLEY INDIAN RESERVATION

1. PURPOSE AND NEED
   - 1.1 INTRODUCTION
   - 1.2 THE PROPOSED PROJECT
   - 1.3 NEED FOR THE PROPOSED PROJECT
   - 1.4 SCOPING PROCESS
   - 1.5 COOPERATING AGENCIES
   - 1.6 STATUS OF FEDERAL AND STATE APPROVALS

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION
   - 2.1 PROPOSED ACTION
     - 2.1.1 Applicant's Site Selection Process
       - 2.1.1.1 Candidate Site Identification and Screening
       - 2.1.1.2 Selection of Proposed and Alternative Sites
       - 2.1.1.3 Potential Sites on Skull Valley Indian Reservation
     - 2.1.2 Site Preparation and Construction
       - 2.1.2.1 Site Development
       - 2.1.2.2 Plant Design and Layout
       - 2.1.2.3 Utilities and Other Services
       - 2.1.2.4 Access Road, Fences, and Other Ancillary Facilities
       - 2.1.2.5 Intermodal Transfer Point Facility
       - 2.1.2.6 Improvements and Additions to Skull Valley Road
       - 2.1.2.7 Rail Spur (or any Rail Spur options)
       - 2.1.2.8 Resource Requirements and Waste Generation
     - 2.1.3 Operation
       - 2.1.3.1 Transportation of Spent Fuel to PFSF
       - 2.1.3.2 Receipt and Transfer of Spent Fuel at PFSF
       - 2.1.3.3 Operation of the Storage System
       - 2.1.3.4 Emissions, Effluents, and Solid Wastes
     - 2.1.4 Decommissioning
   - 2.2 NO ACTION ALTERNATIVE
   - 2.3 ALTERNATIVE SITES FOR SPENT FUEL STORAGE
     - 2.3.1 Site Selection Process Used by the Applicant
     - 2.3.2 Alternative Off-site Location
     - 2.3.3 Alternate Location on the Skull Valley Reservation
   - 2.4 ALTERNATIVE SPENT FUEL STORAGE TECHNOLOGIES
   - 2.5 STAFF CONCLUSIONS AND RECOMMENDATIONS

3. AFFECTED ENVIRONMENT
   - 3.1 GENERAL SITE DESCRIPTION
   - 3.2 ATMOSPHERIC RESOURCES

4.2.1.5 Land Use
4.2.1.6 Socioeconomic and Community Resources
4.2.1.7 Environmental Justice
4.2.1.8 Cultural and Archaeological Resources
4.2.1.9 Noise
4.2.1.10 Transportation
4.2.2 Radiological Impacts
4.2.2.1 Dose Evaluation Methods
4.2.2.2 Dose Estimates for Routine Operations
4.2.2.3 Transportation
4.2.2.4 Accident Analysis
4.2.3 Cumulative Environmental Impacts
4.2.3.1 Air Quality
4.2.3.2 Groundwater and Surface Water Hydrology
4.2.3.3 Geology and Soils
4.2.3.4 Ecological Resources
4.2.3.5 Land Use
4.2.3.6 Socioeconomic and Community Resources
4.2.3.7 Environmental Justice
4.2.3.8 Cultural and Archaeological Resources
4.2.3.9 Noise
4.2.3.10 Transportation
4.2.4 Unavoidable Adverse Environmental Impacts
4.2.5 Relationship Between Short-Term Uses and Long-Term Productivity
4.2.6 Irreversible and Irretrievable Commitment of Resources
4.3 DECOMMISSIONING
4.4 NO-ACTION ALTERNATIVE
4.5 ALTERNATIVE SITES
4.6 ALTERNATIVE SPENT FUEL STORAGE TECHNOLOGIES

5. COST/BENEFIT ANALYSIS
5.1 ECONOMIC COSTS OF CONSTRUCTING AND OPERATING THE PROPOSED PROJECT
5.2 COST/BENEFIT OF THE PROPOSED PROJECT AND ALTERNATIVES
5.3 COST/BENEFIT SUMMARY
5.4 STAFF ASSESSMENT

6. ENVIRONMENTAL MONITORING PROGRAMS
6.1 PREOPERATIONAL MONITORING
6.2 OPERATIONAL MONITORING

7. FEDERAL AND STATE ENVIRONMENTAL REQUIREMENTS

8. AGENCIES CONSULTED

9. LIST OF PREPARERS

10. REFERENCES

INDEX

APPENDICES (e.g., Comments on DEIS and Responses to Comments, Consultation Letters)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 8, 1999

Dear Addressee:

On April 29, 1999, the U.S. Nuclear Regulatory Commission (NRC), U.S. Bureau of Land Management (BLM), and U.S. Bureau of Indian Affairs (BIA) held public scoping meetings in Salt Lake City, and Tooele, Utah, on certain aspects of the environmental impact statement (EIS) for the independent spent fuel storage installation facility (ISFSI) proposed by Private Fuel Storage, L.L.C. A number of interested parties attended the scoping meetings and provided comments. In addition to comments received at the meetings, interested parties also provided written comments to the NRC, BLM, and BIA. The enclosed Scoping Report summarizes the comments received and supplements the NRC's September 1998 scoping report, which summarizes comments received during the 1998 scoping process for the proposed ISFSI. This Supplemental Scoping Report was coordinated with BLM and BIA.

The public scoping process is a valuable and fundamentally important part in the preparation of any EIS. The participation provided during the scoping process for this proposed project is appreciated and will assist the NRC, BLM, and BIA in the preparation of the EIS. This Supplemental Scoping Report is being provided to all individuals who attended one of the April 29, 1999, meetings and provided a mailing address. The 1998 Scoping Report and the enclosed Supplemental Scoping Report are both available for public inspection at the NRC's Public Document Room in the Gelman Building, 2120 L Street, NW Washington, DC 20555. The Supplemental Scoping Report can also be obtained from the BLM's field office (2370 South 2300 West, Salt Lake City, Utah 84119) and BIA's offices (988 South 7500 East, Fort Duchesne, Utah 84026 or 400 North 5th Street, Phoenix, Arizona 85004).

Sincerely,

E. William Brach, Director
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: Supplemental Scoping Report

cc w/encl: Service lists
Meeting attendees

DOCKET 72-22

Environmental Impact Statement Scoping Process

Supplemental Scoping Report

Private Fuel Storage Facility

Skull Valley Indian Reservation, Tooele County, Utah

November 1999

U.S. Nuclear Regulatory Commission
Washington, DC

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1. INTRODUCTION

Private Fuel Storage L.L.C. (PFS), a company owned by eight U.S. electric utilities,[1] has applied to the U.S. Nuclear Regulatory Commission (NRC or Commission) for a license to construct and operate an independent spent fuel storage installation (ISFSI). Pursuant to the Atomic Energy Act, as amended, and the Commission's regulations in Title 10 of the *Code of Federal Regulations*, PFS filed an application (Docket No. 72-22) with an accompanying Environmental Report on June 20, 1997, for a specific license to receive, transfer, and possess nuclear power reactor spent fuel and other radioactive material associated with spent nuclear fuel (SNF) storage in an ISFSI. The application proposed to construct and operate the ISFSI on land leased from the Skull Valley Band of Goshute Indians. The proposed facility would be located on an 820-acre site in the northwest corner of the Skull Valley Band of Goshute Indian Reservation. The reservation is located within the geographic boundaries of Tooele County, Utah, approximately 27 miles west-southwest of the city of Tooele. The proposed facility would store up to 40,000 metric tons of uranium (MTU) in a maximum of 4,000 casks. The application also proposed that SNF would be transported from the reactor sites via rail to an Intermodal Transfer Point (ITP), located at Timpie, Utah. From the ITP, the fuel would be transported to the site via Skull Valley Road (using a heavy haul vehicle) or via a proposed rail line that would run parallel to Skull Valley Road. By letter dated August 28, 1998, PFS submitted an amendment to its application. The amendment proposed to (1) move the ITP approximately 1.8 miles West of Timpie, and (2) construct a rail line along the base of the Cedar mountains from the Low Junction (Skunk Ridge) to the ISFSI site in lieu of the rail line parallel to Skull Valley Road. This proposed rail route would traverse land managed by the Bureau of Land Management (BLM).

Pursuant to its regulations in 10 CFR Part 51, the NRC is preparing an environmental impact statement (EIS) on the proposed facility as part of its decision-making process. In addition to the EIS, the NRC is preparing a Safety Evaluation Report (SER) to address safety aspects of the proposed facility.

Both the Bureau of Indian Affairs (BIA) and BLM are cooperating agencies in the preparation of the EIS. As trustees for the Skull Valley Band of the Goshute Indians, BIA has responsibility to ensure that the interests of the tribe are not compromised by construction and operation of the proposed ISFSI. Therefore, BIA must approve any lease agreement between the PFS and the Skull Valley Band of Goshute Indians. To date, BIA has conditionally approved the lease between PFS and the Skull Valley Band of Goshute Indians, contingent upon the completion of an EIS, inclusion of mitigation measures identified in the BIA's Record of Decision, and the issuance of an NRC license. As manager of the Federal land over which rail access to the site is being proposed, BLM must issue a right-of-way to PFS for the construction and use of the proposed rail line. The

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[1]As per p. 1-10 of the PFS License Application, the members of the limited liability company are: Genoa FuelTech, Inc., Indiana Michigan Power, Consolidated Edison Company of New York, GPU Nuclear Corporation, Northern States Power Company, Illinois Power Company, Southern Nuclear Operating Company, and Southern California Edison.

Resource Management Plan (RMP)[2] for the Federal land in question does not allow major rights-of-way, such as a rail line, outside of designated corridors. As the proposed rail line location is outside a designated corridor, BLM must amend the RMP prior to or concurrent with the issuance of a right-of-way for the proposed rail line.

The proposed facility would store SNF inside sealed canisters, which are enclosed in steel and concrete casks that provide shielding and additional mechanical protection to the fuel. The canister/cask-based system confines radioactive wastes and would be licensed by NRC in accordance with 10 CFR Part 72 requirements for storage of SNF. The proposed facility would be designed to store SNF for an initial license period of 20 years that would be subject to renewal for an additional 20 years. The applicant anticipates that by the end of the 40-year period all SNF stored at the proposed facility would have been transferred offsite, and the ISFSI site would be decommissioned. PFS anticipates receiving a license by 2002 in order to commence operation. Ownership and ultimate responsibility for the SNF would continue to remain with the utilities that generated it until such time as the fuel is transferred to the U.S. Department of Energy (DOE).

The scoping process was initiated on May 1, 1998, with the publication in the *Federal Register* of a Notice of Intent (NOI) to prepare an EIS and conduct the scoping process (63 *Fed. Reg.* 24197–98). As described in the NOI, the objectives of the scoping process are to:

1. define the scope of the proposed action which is to be the subject of the EIS;
2. determine the scope of the EIS and identify significant issues to be analyzed in depth;
3. identify and eliminate from detailed study issues which are peripheral or are not significant;
4. identify any environmental assessments and other EISs which are being or will be prepared that are related to but not part of the scope of the EIS under consideration;
5. identify other environmental review and consultation requirements related to the proposed action;
6. indicate the relationship between the timing of the environmental analyses and the Commission's tentative planning and decision-making schedule;
7. identify any cooperating agencies and, as appropriate, allocate assignments for preparation and schedules for completion of the EIS to the NRC and any cooperating agencies; and
8 describe the means by which the EIS will be prepared, including any contractor assistance to be used.

As a part of the scoping process, a public scoping meeting was held on June 2, 1998, in Salt Lake City, Utah. Several interested parties attended the meeting and provided comments. In addition to the comments received at the meeting, written comments were also provided to the NRC. In September 1998, the NRC issued a scoping report which summarized the determinations and conclusions reached in the initial scoping process. The initial scoping process was based on the description of the ISFSI contained in the June 20, 1997, application, which did not include the changes made to the proposed facility as a result of the August 28, 1998, amendment. Similarly, BIA's contingent approval of the lease was issued prior to the PFS amendment. The NRC, BLM, and BIA determined that the revision to the transportation proposal contained in the PFS amendment warranted supplementing the scoping process. Two additional public scoping meetings were held on

[2]The rail line would traverse land within the Pony Express Resource Management Plan.

April 29, 1999, one in Salt Lake City, Utah, and a second in Tooele, Utah. The focus of the meetings was limited to environmental issues related to the proposed rail line, the request for issuance of a right-of-way over public lands managed by BLM, and any environmental concerns associated with the proposed lease agreement that may not have been addressed in the NRC's initial scoping process. In addition to the comments received at the public meetings, written comments related to the proposed rail line and the lease agreement were also accepted until May 28, 1999. This report summarizes the oral and written comments received as a result of the most recent scoping activities. Individuals and organizations who provided comments during the scoping period will receive a copy of this report and subsequent documents such as the Draft and Final EIS. This report supplements the September 1998 scoping report. The NRC staff is currently preparing a draft EIS. Oak Ridge National Laboratory is the contractor selected by NRC to provide technical assistance in the preparation of the EIS. The environmental comments received as a result of the scoping process will be duly considered in the preparation of the draft EIS.

After publication of the draft EIS (anticipated to be Spring 2000), the public will be invited to comment on that document. After evaluating comments on the draft EIS, NRC will issue a final EIS that will serve as the basis for the Commission's consideration of environmental impacts in its decision on licensing the proposed ISFSI and for issuance of decisions by the cooperating agencies with authorizing actions. Section 2 of this report summarizes the comments and concerns expressed by government officials, agencies, and the public associated with the applicant's proposed August 28, 1998, amendment and any environmental concerns associated with the proposed lease agreement that may not have been addressed in the NRC's initial scoping process. Section 3 identifies the issues the EIS will address and those issues that are not within the scope of the EIS. Where appropriate, Section 3 identifies other places in the decision-making process where issues that are outside the scope of the EIS may be considered.

2. SUMMARY OF ISSUES RAISED DURING THE SCOPING PROCESS

2.1 OVERVIEW

On April 29, 1999, NRC held public scoping meetings in Salt Lake City, and Tooele, Utah on certain aspects of the EIS for the proposed ISFSI in Skull Valley, Utah. Specifically, the scoping meetings focused on the environmental issues of the proposed rail line, the request for issuance of a right-of-way over public lands managed by BLM, and any environmental concerns associated with the proposed lease agreement that may not have been addressed in the NRC's initial scoping process. During the scoping meetings, 20 individuals offered comments about the proposed action. Of these 20 speakers, 1 represented a member of the U.S. Congress, 1 represented a sovereign Indian tribe, 5 were representing State of Utah agencies or departments, and 13 spoke on behalf of other organizations or as private citizens. In addition, 9 written statements from individuals, organizations, and agencies were received during the scoping period. Some of these submittals were written statements or summaries of the verbal testimony. This active participation by the public in the scoping process is an important component of determining the major issues that the EIS should assess.

Individuals providing oral and written comments addressed several subject areas. The comments received were categorized into the following general topics:

- safety and accidents;
- transportation impacts;
- cumulative impacts and scope of the analysis;
- compliance with Federal, State, and local permits (including amending the BLM Pony Express Resource Management Plan);
- geology, soils and seismicity;
- hydrology (surface water and groundwater);
- socioeconomics (including land use, aesthetics, recreational resources, and cost-benefit analyses);
- ecology;
- cultural resources;
- need for the facility;
- emergency preparedness;
- decommissioning and long-term storage; and
- alternatives.

Some of the comments received addressed issues that were discussed during the previous scoping process, and two commentors re-submitted written comments provided during the previous scoping period. The September 1998 scoping report summarizes these comments and, therefore, will not be discussed in detail in this report. In addition, some commentors offered opinions and concerns that typically would not be included in the subject matter of an EIS, for example, general opinions about nuclear energy policy in the United States or issues that are more appropriately considered in the NRC's SER. Comments of this type are taken into consideration by the NRC, BLM, and BIA, but because they do not point to significant environmental issues to be analyzed, they will not be discussed in detail in this report. Other statements may be relevant to the proposed action, but they have no direct bearing on the evaluation of alternatives or on the decision-making process involving the proposed action. For instance, general statements of support for or opposition to the proposed project fall into this category. Again, comments of this type have been noted but are not used in defining the scope and content of the EIS.

Attachment A to this report lists the commentors and, on the basis of the topics listed above, shows the subject areas covered by their comments.[3] Note that Attachment A lists all comments received (i.e., within or outside of the scope of this scoping report) during the most recent comment period. Attachment B contains a proposed outline for the draft EIS, which considers the oral and written scoping comments received during the most recent scoping activities as well as the previous scoping process.

Section 2.2 summarizes the comments received during the most recent scoping process. Comments that were similar in nature to those received during the previous scoping process are not discussed in detail. Many of the issues raised have a direct bearing on the analysis of potential environmental impacts and the NRC's related decision-making process. Section 2.3 briefly describes other sources of project-related information that were considered during the scoping process for the EIS.

2.2 SUMMARY OF ISSUES RAISED

2.2.1 Safety and Accidents

The comments received in this area did not identify any new or different issues beyond those discussed during the previous scoping process.

2.2.2 Transportation Impacts

Several commentors expressed concern about the potential for accidents and sabotage during the transport of the spent nuclear fuel. Most of the comments echoed those presented during the first scoping process, however, a few commentors did introduce new concerns. One commentor suggested that the EIS consider the cumulative impacts of transportation resulting from the proposed facility, similar to the analysis completed by the NRC in NUREG-1437, Volume 1, Addendum 1, "Generic Environmental Impact Statement for License Renewal of Nuclear Plant." The commentor also suggested that the EIS evaluate design and operation details of the proposed rail line, and identify the necessary State of Utah permits and requirements for the construction and operation of the proposed rail line. One commentor suggested that the EIS consider specific sabotage scenarios. Another commentor suggested that the increasing traffic density on rail lines resulting from increasing consolidation and abandonment of rail lines, due to mergers, will directly affect the throughput of proposed spent fuel rail shipments. The commentor then suggested that the increase in traffic density increases the statistical probability and severity of potential accidents.

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[3] Two individuals re-submitted written comments that were originally provided during the 1998 scoping process. These comments are not reflected in Attachment 1.

2.2.3 Cumulative Impacts and Scope of the Analysis

Two commentors indicated that the EIS cumulative impacts analysis should be comprehensive and include the impacts of construction and operation of the proposed rail line. One commentor noted that the proposed rail line is being constructed solely to move spent fuel casks from the Union Pacific mainline to the Skull Valley Reservation, and the impacts should be considered in the EIS. One commentor suggested that if the intent is to expand the proposed rail line to Dugway, then the EIS address the impacts of doing so in this EIS .

2.2.4 Compliance with Applicable Local, State, and Federal Regulations

Some commentors indicated that State permits are required for the construction and operation of the proposed rail line and the ITP. One commentor indicated that permission must be obtained from the Utah Department of Transportation and Utah Department of Environmental Quality regarding a number of design, construction, and operational requirements for the proposed transportation methods where vehicles exceed size and weight restrictions. Another commentor stated that by State statute, the Utah Department of Transportation has the responsibility to approve the establishment of any new rail crossings of public roads as well as any work on existing crossings. Comments were also received that noted BLM is required to coordinate its proposed actions with the State to determine whether the proposed actions are consistent with State purposes, plans, policies, and programs.

Several commentors expressed concern about the proposed amendment to the BLM Pony Express RMP. One commentor suggested that because the RMP never contemplated the establishment of a rail line, the entire RMP should be reopened. Another commentor indicated that in amending the RMP, BLM is required to conform to the same National Environmental Policy Act (NEPA) EIS planning process, and therefore, should consider alternatives, including a no action alternative. Other comentors suggested that the BLM should consider the economic impact to trust lands as a result of amending the RMP to allow a rail line, and that the RMP EIS review not be limited to the rail line, but consider all of the changes occurring in the RMP area.

2.2.5 Geology and Soils

Commentors expressed concern about the geological conditions in the western portion of Skull Valley and the potential impacts that could result from construction and operation of the rail line. One commentor noted that the proposed rail line route would cross two capable faults and a third fault that may be capable. The commentor suggested that the EIS consider the impacts of greater than expected ground shaking and the possibility of a surface rupturing earthquake along the rail route. The commentor also identified other geological hazards along the proposed rail route such as expansive and collapsible soils and debris flows and floods.

Another commentor suggested that the EIS carefully consider the impacts of constructing the proposed rail line, including mitigation measures, because the soils in the area could be contaminated with radiological and chemical materials. One commentor listed several minerals thought to exist near the proposed rail line route. The commentor suggested that the construction and operation of a rail line in the area could negatively affect the ability to open pit mine for the resources and that the EIS should consider the economic loss to the State and to the Skull Valley Band.

2.2.6 Hydrology (Surface Water and Groundwater)

Commentors felt that the effects of construction and operation of the proposed project on surface water and groundwater resources should be assessed in detail for the proposed rail line and ITP. One commentor noted that during periods of intense rainfall and rapid snow melt, stream floods emanate from the mouth of the canyon. The commentor went on to suggest that these floods could potentially pose a hazard to the operation of the rail line. Other commentors suggested that the EIS discuss the water needs, including water requirements to fight fire, for the operation of the rail line and the ITP; the EIS identify the water rights and methods for obtaining those rights; and the EIS address the flood potential and method of managing floods from the greater watershed along the proposed rail line and at the ITP.

2.2.7 Socioeconomics

Commentors expressed concern about the impacts the proposed rail line could have on land use and value. Other commentors raised other socioeconomic issues such as the potential for increased rail line congestion and cost-benefit analysis issues.

Commentors were concerned about the effect of the proposed rail line on land values in the area, particularly public lands such as State-administered Trust lands and lands owned by other Indian tribes. One commentor stated that the effect of public apprehension on the market value and revenue potential for Trust lands near the proposed rail line are of concern and should be discussed in the EIS. Another commentor indicated that approval and use of BLM land for a rail line could result in a decline in property value and ultimately impact the economy of other nearby Indian Tribes.

Others indicated that the proposed project may alter the land use patterns of the area and set an undesirable precedent for future land use. Specifically, commentors noted that the rail line is due to cross land identified by the Southern Utah Wilderness Alliance as an area possessing wilderness character, and that impacts, such as noise and aesthetics, on wilderness and recreational areas from construction and operation of the rail line must be quantified. Comments from various individuals suggested that the presence of the rail line would disrupt recreational activities such as off-road vehicle use and hunting; that the storage and transportation of SNF in Skull Valley could impact the vitality and mission of the Utah Test and Training Range, operated by Hill Air Force Base, and such an impact should be considered because Hill Air Force Base is a major part of the State economy; and that the rail line could have adverse impacts on livestock grazing and animal movement.

One commentor indicated that the cost-benefit analysis must thoroughly evaluate and include the indirect and direct cost of the proposed rail line, including the cost associated with the potential impact to historic trails near the proposed rail line. It was also suggested that the EIS reflect all the social costs and benefits from granting the rights-of-way to build the rail line and the ITP. One commentor suggested that the EIS consider the economic loss if the proposed rail line route prevented the mining of minerals thought to be in the area.

2.2.8 Ecology

Commentors expressed several concerns about the impacts of the construction and operation of the proposed rail line on plant and animal species of the region. One commentor suggested that the proposed rail line should not be allowed to disturb these areas that have already been designated as important wildlife habitat, and that BLM should ensure that the rail line and transportation of SNF are consistent with each of the specific Habitat Management Plans, or the BLM should amend the Pony Express RMP, Wildlife and Fisheries Decision.

One commentor indicated that endangered, threatened, and candidate plant and animal species could potentially exist in the Low Corridor. The commentor also suggested that these species, other species, and their food base may be impacted by the construction and operation of the rail line. Another commentor noted that the rail line may disrupt other established wildlife migration patterns for mule deer and pronghorn antelope, and that noise levels from the construction and operation of the rail line may also disrupt mating and breeding activities. The commentor also noted that the RMP proposed to fully cooperate with the reintroduction of the Peregrine Falcon into the Timpie Springs area and that surface disturbing activities on public lands adjacent to these areas would not be permitted to disturb birds or destroy important habitat.

Several commentors noted that wild horses frequent the area where the rail line is being proposed, and one commentor suggested that the rail line would probably cut off the winter feeding range for the wild horses. Other comments received suggested that impacts due to increased mortality from collision with the rail cars be considered in the EIS; that preserving the foothills is necessary because some animal habitats exist at different elevations or some animals need to travel from one elevation to another; and that the operation of the rail line could potentially introduce unwanted species and result in an impact to the area. In addition, one commentor stated that deer near the rail line are hunted and used for food by some members of the Skull Valley Band. The commentor expressed concern that the construction and operation of the rail line may impact this activity.

Commentors also expressed concern about the impact to vegetation in the area. One commentor noted that the hundreds of acres of vegetation that will be disturbed during the construction of the proposed rail line provides habitat for a variety of wildlife species. Several commentors expressed concern about the impact of fire on vegetation near the rail line. One commentor suggested that sparks from the rail line may result in fires that could result in the loss of native vegetation that would then be replaced by less desirable seed grasses. Another commentor noted that the rail line would introduce a new fire source to an area that already has a high incident of wildfires. The commentor went on to suggest that the rail line and the transport of SNF could potentially hinder the ability to fight wildfires and result in increased damage.

2.2.9 Cultural Resources

Several commentors indicated that the proposed rail line may have adverse and unacceptable impacts to historic and archaeological resources in the area. They felt that a full analysis of those potential impacts should be included in the EIS. Some commentors noted that the proposed rail line route could possibly cross two historic trails, the Hasting Trail and the Donner-Reed Trail. One commentor expressed concern about access to the historic trails if the proposed rail line is constructed and also expressed concerns about possible damage to existing ruts and swells in the valley. Other commentors noted that archeological artifacts have been encountered along the proposed rail line route. Another commentor suggested that more artifacts are likely to be found in the vicinity of the proposed rail line. Some commentors noted that the proposed rail line would traverse traditional ancestral lands which are of importance to some members of the Skull Valley Band and other nearby Indian Tribes, and the impacts of this should be considered in the EIS.

2.2.10 Need for the Facility

Comments received in this area did not provide any new or different information than that discussed during the previous scoping process.

2.2.11 Emergency Preparedness

Comments received in this area did not present any new or different issues beyond those discussed during the previous scoping process.

2.2.12 Decommissioning and Long-term Storage

Comments in this area mainly included issues that were addressed in the previous scoping process; however, one commentor did suggest the costs of decommissioning the site, especially after accidents, be compared to the benefits of the lease.

2.2.13 Alternatives

Comments in this area mainly included issues that were addressed in the previous scoping process; however, one commentor did suggest an alternative that was not addressed in the previous process. The commentor suggested that the EIS consider an alternative presented by the Secretary of Energy during congressional testimony on the proposed legislation, H.R. 45, Nuclear Waste Policy Act of 1999. The alternative presented by the Secretary would have SNF remain at the reactor sites and the U.S. Department of Energy take ownership of the spent fuel. One commentor emphasized the need for the EIS to consider alternatives to the proposed rail line and ITP. The commentor suggested that the at least three alternatives be considered: granting either the rail line right-of-way or the ITP right-of-way, granting both rights-of-way, or some other hybrid.

2.3 OTHER SOURCES OF SCOPING-RELATED INFORMATION

Comments from the previous scoping process, the April 29, 1999, public scoping meetings, and the written comments received within the most recent scoping period, are being used to assist NRC, BLM, and BIA in defining the issues and alternatives to be addressed in the EIS. As part of determining the scope of the draft EIS, NRC staff has also reviewed its regulations and generic guidance documents relevant to the preparation of the EIS, as well as many of the documents that were submitted as part of the licensing process for this facility, as appropriate. Some of these documents, although not summarized here, present issues and alternatives that helped to refine the scope of the EIS.

3. SUMMARY AND CONCLUSIONS

3.1 SCOPE OF THE EIS

In the September 1998 scoping report, NRC provided an overview of the scope of the EIS. Following the April 29, 1999, scoping meeting and the public comments received, NRC revisited the scope of the EIS to determine if it needed to be modified. The scope of the EIS described in this section reflects consideration of all the scoping comments received to date on the proposed project. As stated in the previous scoping report, the general content of an EIS prepared by NRC, for the most part, is prescribed by NEPA (Public Law 91-90, as amended), NRC's regulations for compliance with NEPA (10 CFR Part 51), and guidance provided by the Council on Environmental Quality regulations (40 CFR Parts 1500–1508), as well as NRC, BIA, and BLM NEPA guidelines. These regulations broadly define the areas that must be considered in the assessment of potential impacts resulting from a proposed action. In conjunction with these regulatory guidelines, the scoping process summarized in this report helped to identify and refine the project-specific issues that warrant consideration in the EIS.

The EIS will include a cost-benefit analysis that summarizes the environmental and other costs and benefits of the proposed action. On the basis of the regulations and the scoping process, NRC has initially determined that the EIS will assess the potential environmental impacts of the proposed project, for both construction and operation activities, in the following subject areas, as supplemented by the areas identified in Attachment B:

- ***Radiological impacts and human health and safety.*** The potential public health consequences of the proposed action will be evaluated primarily in terms of radiological exposure risk during normal operations, including transport of the SNF (including handling, transfer, and inspection activities) and under credible accident scenarios. Nonradiological events and activities with potential human health impacts will also be identified and evaluated.
- ***Cumulative impacts.*** The EIS will analyze the potential cumulative impacts, if any, of the proposed facility in the context of other existing and proposed facilities and activities in the area of the proposed project area, which includes the site, ITP, and rail line, as appropriate.
- ***Socioeconomics.*** The socioeconomic issues that fall within the scope of the EIS include the direct and indirect economic effects (both beneficial and adverse) on employment, taxes, residential and commercial development, agriculture, and public services in the area. The EIS will include an economic cost-benefit analysis. The effects of the proposed project on land use in the area, including use of public lands, tribal trust lands, and rights-of-way, will be assessed in the EIS. The EIS will also include an evaluation of the extent to which lands and land use may be disturbed or altered during construction and operation of all portions of the proposed action. In addition recreational and tourism sites, wilderness areas, and aesthetic values of the area will be analyzed.
- ***Cultural resources and environmental justice.*** The EIS will assess potential impacts of the proposed project on the historic and archaeological resources of the area and on the cultural traditions and lifestyle of Native Americans. An environmental justice review

will be included in the EIS. The EIS will also discuss the status of the consultation on historic properties required by the National Historic Preservation Act of 1966, as amended.

- ***Geology and seismicity.*** The EIS will describe the geologic and seismic characteristics of the proposed site and evaluate the impacts of construction and operation of the proposed project on the geology and soils. Evaluation of the potential for earthquakes, ground motion, soil stability concerns, surface rupturing, and any other major geologic or seismic considerations that would affect the suitability of the proposed site as a storage location for SNF will be addressed in the SER rather than the EIS; the SER will also address cask design, particularly in the context of potential seismic events.
- ***Transportation.*** The analysis of potential impacts resulting from the transportation of SNF will consider relevant aspects of both rail and truck transport to the proposed facility. The EIS will discuss the number, type, and frequency of shipments, as well as routing considerations and the quantities of SNF being shipped. The impacts of transportation will be evaluated primarily in terms of radiological exposure risk during normal transportation (including handling, transfer, and inspection) and under credible accident scenarios. The non-radiological impacts of transportation will also be identified and evaluated. Construction activities required for road or rail systems will be assessed, including input from BIA and BLM.
- ***Accidents.*** NRC safety regulations and guidance specify that the facility be designed to withstand various credible accidents, including natural events, without having a significant radiological release. The SER will include an evaluation and determination on the adequacy of the design to withstand credible accidents at the proposed facility, determine if any radiological release will occur as a result of the accident, and determine the significance of the radiological release. The EIS will analyze the potential environmental impacts resulting from credible accidents at the proposed facility.
- ***Compliance with applicable regulations.*** The EIS will present a listing of the relevant permits and regulations that are believed to apply to the proposed facility. Regulatory or legal issues that will be covered in the EIS include water rights, land use restrictions such as rights-of-way, and oil, gas, or mineral leases that would interfere with the availability or suitability of the proposed site.
- ***Air quality.*** Potential air quality impacts of the proposed project will be evaluated in the EIS. The evaluation will include potential impacts resulting from construction activities and operation and will compare the anticipated air quality impacts, if any, with relevant standards. If appropriate, modeling will be performed to assist in the analysis of potential air quality impacts.
- ***Hydrology.*** The EIS will assess the potential impacts of the proposed project on surface water and groundwater resources. The assessment will consider water resources, water quality, water use, floodplains, and the probable maximum flood.
- ***Ecological resources.*** The EIS will assess the potential environmental impacts of the proposed action on ecological resources, including plant and animal species and threatened or endangered species or critical habitat that may occur in the area. As appropriate, the assessment will include potential effects on wildlife migration patterns; and mitigation measures to address adverse impacts will be analyzed. The EIS will also discuss the status of any consultation required by the Endangered Species Act of 1973, as amended.

- ***Need for the facility.*** A discussion of the need for the proposed facility and the expected benefits will be presented in the EIS and will include an estimate of the amounts of SNF generated by participating nuclear power plants and the utilities' capabilities to store that fuel.
- ***Decommissioning.*** The EIS will include a general discussion of decommissioning of the facility and associated impacts.
- ***Alternatives.*** The no-action alternative and other reasonable alternatives to the proposed action will be described and assessed in the EIS. Other reasonable alternatives to the proposed action, such as alternative sites or alternative storage methods, will be considered.

3.2 ISSUES OUTSIDE THE SCOPE OF THE EIS

The purpose of an EIS is to assess the potential environmental impacts of a proposed action as part of the decision-making process of an agency—in this case, for three agencies, NRC (a licensing decision), BIA (lease approval decision), and BLM (granting a right-of-way). It should be noted that each agency's final decision (i.e., completion of its Federal actions) will not be made until after the Final EIS is issued. Some issues and concerns raised during both scoping processes (June 1998 and April 1999) are not relevant to the EIS because they are not directly related to the assessment of potential impacts or to the decision-making process. Exclusion from the EIS, however, does not suggest that an issue or concern lacks value. Issues beyond the scope of an EIS may be appropriately discussed and decided in other venues, such as the NRC safety review or the BIA lease approval review.

Some of the issues raised during the public scoping will not be addressed in the EIS. These include legal issues such as the potential conflict between Federal laws regarding Tribal sovereignty and State laws regarding waste storage. An analysis of DOE's statutory responsibilities regarding SNF, particularly as legislated in the Nuclear Waste Policy Act, is also outside the scope of the EIS; and DOE's responsibilities regarding SNF do not require that DOE be a cooperating agency for this EIS. Similarly, DOE's activities at Yucca Mountain and questions about the future availability of that site are beyond the scope of the EIS, as is the potential that such a facility may not become available within the next 40 years [see 10 CFR 51.23(b)]. Issues related to DOE's responsibilities for commercial nuclear reactor SNF are addressed in DOE's "Draft Environmental Impact Statement for a Geological Repository for the Disposal of Spent Nuclear Fuel and High Level Radioactive Waste at Yucca Mountain, Nye County, Nevada," DOE/EIS-0250D, July 1999.

Some issues raised during the public scoping process for the proposed facility are outside the scope of the EIS, but they will be analyzed in the SER. The EIS and the SER are related in that they may cover the same topics and may contain similar information, but the analysis in the EIS is limited to an assessment of potential environmental impacts. In contrast, the SER primarily deals with safety evaluations and procedural requirements or license conditions to ensure the health and safety of workers and the general public. The SER also covers other aspects of the proposed action such as demonstrating that the applicant will provide adequate funding for decommissioning of the facility (in compliance with NRC financial assurance regulations) and that the site-specific emergency preparedness procedures are appropriate. Also, the design of the transport, transfer, and storage casks will be evaluated in the SER or in separate rulemaking proceedings for conformity with NRC regulations regarding safety and testing. The SER will include an evaluation of the safeguards at the proposed facility (pursuant to 10 CFR Part 73).

Attachment A

Comment Subject Areas by Commentor
Oral and Written Comments

Commentor and affiliation (ifany)	Transportation Impacts	Safety and Accident	Cumulative Impacts	Emergency	Ecology	Cultural Resources	Socioeconomics	Alternatives	Need for the Facility	Geology & Soils	Hydrology	Deconmissioning	Fed, State, Local Permits
Oral Comments													
Lee Allison, Utah Geological Survey						√				√	√		
Lawrence Bear							√		√				
Leon Bear, Chairman Skull Valley Band of Goshute Indians						√							
Margene Bullcreek	√	√			√	√				√			
Michael Canning, Beehive Division of WIldlife					√								
Kelly Casaday, Congressman Merrill Cook's Office									√				
Steve Erickson, Downwinders			√		√	√		√		√			√
R.J. Hoffman									√				
Orlando Jerez, Utah Department of Transportation													√
Cindy King, Utah Chapter of the Sierra Club													√
Al Mulder, Oregon/California Trails Association						√							

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APPENDIX B

CONSULTATION LETTERS

This appendix displays copies of the correspondence between the preparers of this Environmental Impact Statement (EIS) and the agencies requiring formal consultation as part of the environmental review process. Each set of letters is described below.

B.1 Consultation in Accordance with the Federal Endangered Species Act of 1973

The Endangered Species Act of 1973, as amended (16 USC 1531 *et seq.*), provides for the conservation of threatened and endangered species and the ecosystems on which those species rely. Under the requirements of Section 7 of the Act, a Federal agency must consult with the U.S. Fish and Wildlife Service (FWS) (part of the Department of the Interior) and the National Marine Fisheries Service (NMFS) (part of the Department of Commerce) if a proposed action could affect threatened or endangered species or their habitat. The outcome of this consultation would be a biological opinion issued by FWS or NMFS that would state whether or not the proposed action would jeopardize the continued existence of the subject species or would result in the destruction or adverse modification of any critical habitat for such species.

The letters displayed in this appendix document the consultation process with the FWS and the FWS's reply. Consultation with the NMFS is not applicable to this proposed action because of the distance between the proposed project and any potentially affected marine environment.

B.2 Consultation in Accordance with the National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act (NHPA), as amended (16 USC 470 *et seq.*) requires Federal agencies to take into account the effects of their proposed actions on properties listed on or eligible for listing on the *National Register of Historic Places (National Register)*. Prior to approval of an action, Federal agencies must give the Advisory Council on Historic Preservation (the Council) a reasonable opportunity to comment on the proposed action. In addition, Section 110(f) of the Act requires specific planning and action be taken to minimize harm to any national historic landmarks that may be directly and adversely affected by a Federal agency's actions.

The first step in compliance with Section 106 of the NHPA is to identify and evaluate historic properties in the vicinity of the proposed action. The usual process is for the Federal agency, with the assistance of the State Historic Preservation Officer (SHPO) in the state in which the proposed action will occur, to locate and evaluate all known historic properties or such properties potentially eligible for listing on the *National Register*. If there are no such properties, the agency must provide documentation of that fact to the SHPO. If historic properties are present, the agency must determine whether the proposed action could affect the properties in any way. If required after this evaluation, the agency would consult with the Council and the SHPO regarding potentially adverse effects. Such consultations generally result in the development of a Memorandum of Agreement that includes specifications and procedures to be followed to minimize or mitigate potential adverse impact to a historic resource.

The Cooperating Federal Agencies contacted regional Federally Recognized Indian Tribes and other organizations soliciting their interest in being consulting parties in the Section 106 process. These letters are displayed in this appendix along with the responses received to these letters soliciting interest in participating in the Section 106 process.

The letters shown in this appendix document the consultation process as follows:

Exhibits	Letters displayed
B.1-1 through B.1-4	NRC and FWS correspondence
B.2-1 through B.2-9	NRC and SHPO correspondence
B.3-1 through B.3-4	NRC and Council correspondence
B.4-1 through B.4-8	Solicitations of interest in being consulting parties and NRC and Ohngo Gaudadeh Devia correspondence
B 5-1 through B.5-32	Concurrence letters (e.g., requests for concurrence on eligibility determinations for the archaeological and historic sties identified within the area of potential effect for the proposed facility) and associated correspondence (e.g., notifications of extensions of review period).

Correspondence dealing with the Section 106 process contains some sensitive information that is being withheld from disclosure. This correspondence is not included in this appendix.

Some of the correspondence reproduced in this appendix had multiple recipients. Those recipients are listed below rather than presenting the letters as duplicates in this appendix. In addition, some correspondence contained duplicates of attachments to related correspondence by the same organization or individual. Those submissions appear only once in this appendix. Lastly, service lists for project-related correspondence are maintained in the NRC Spent Fuel Program Office.

Letter dated July 1, 1999 (Exhibit B.4-1)

Mr. Leon Bear, Chairman
Skull Valley Band of Goshute Indians
Salt Lake City, Utah

Mr. Vince Garcia, Chair
South Fork Band Council
Te-Moak Tribe of Western Shoshone
Elko, Nevada

Mr. David Gonzales, Chair
Elko Band Council
Te-Moak Tribe of Western Shoshone
Elko, Nevada

Mr. David Pete, Chair
Goshute Indian Tribe
Ibapah, Utah

Ms. Andrea Woods, Chair
Wells Band Council
Te-Moak Tribe of Western Shoshone
Wells, Nevada

Mr. Ronald Wopsock, Chair
The Ute Indian Tribe
Ft. Duchesne, Utah

Letter dated Dec. 28, 1999, and January 5, 1999 (Exhibit B.4-2)

Mr. Jay Banta, President Elect
The Lincoln Highway Association
Utah Chapter
Dugway, Utah

The Honorable Leon D. Bear, Chairman
Skull Valley Band of Goshute Indians
Salt Lake City, Utah

The Honorable Guen Davis, Chairperson
Northwestern Band of Shoshone Nation
Blackfoot, Idaho

Dugway Proving Ground

Mr. Vern Gorzitze
Utah Crossroads Chapter
The Oregon California Trail Association
Salt Lake City, Utah

Mr. Patrick Hearty, Past Chairman
Utah Historic Trails Consortium
South Jordan, Utah

The Honorable Milton Hooper, Chairman
Goshute Indian Tribe
Ibapah, Utah

Mr. George Ivory, Chairman
Utah Historic Trails Consortium
Midvale, Utah

Mr. Jere Krakow, Superintendent
National Park Service Long Distance Trails Office
Salt Lake City, Utah

Paiute Indian Tribe of Utah
Cedar City, Utah

Mr. Jesse G. Petersen, President
The Lincoln Highway Association
Tooele, Utah

Mr. Richard Poulsen
The Iosepa Historical Association
West Valley Utah Branch 01
West Valley, Utah

Mr. Lester Tippie, President
National Railway Historical Society
Promontory chapter
Salt Lake City, Utah

Mr. Ronald Wopsock, Chair
The Ute Indian Tribe
Ft. Duchesne, Utah

Letter dated Apr. 26, 2000 (Exhibit B.4-6)

The Honorable Geneal Anderson, Chairperson
Paiute Indian Tribe of Utah
Tribal /Council
Cedar City, Utah

Mr. Jay Banta, President Elect
The Lincoln Highway Association
Utah Chapter
Dugway, Utah

The Honorable Leon D. Bear, Chairman
Skull Valley Band of Goshute Indians
Salt Lake City, Utah

Ms. Kathleen Callister, Archeologist
US Army Dugway Proving Ground
Dugway, Utah

The Honorable Guen Davis, Chairperson
Northwestern Band of Shoshone Nation
Blackfoot, Idaho

The Honorable Vince Garcia, Chairman
South Fork Band Council
Te-Moak Tribe of Western Shoshone
Elko, Nevada

The Honorable David Gonzales, Chairman
Elko Band Council
Te-Moak Tribe of Western Shoshone
Elko, Nevada

The Honorable Milton Hooper, Chairman
Goshute Indian Tribe
Ibapah, Utah

Mr. George Ivory, Chairman
Utah Historic Trails Consortium
Midvale, Utah

Mr. Jere Krakow, Superintendent
National Park Service Long Distance Trails Office
Salt Lake City, Utah

Mr. Jesse G. Petersen
The Lincoln Highway Association
Tooele, Utah

Mr. Richard Poulsen
The Iosepa Historical Association
West Valley, Utah

The Honorable Andrea Woods, Chairperson
Wells Band Council
Te-Moak Tribe of Western Shoshone
Wells, Nevada

Letter dated Oct.16, 2000 (Exhibit B.5-4)

Steve Berlin, President
The Oregon California Trail Association
Utah Crossroads Chapter
Salt Lake City, Utah

George Ivory, Chairman
Utah Historic Trails Consortium
Midvale, Utah

Jesse G. Petersen, President
The Lincoln Highway Association
Tooele, Utah

Letter dated Oct. 16, 2000 (Exhibit B.5-7)

The Honorable Geneal Anderson, Chairperson
Paiute Indian Tribe
Cedar City, Utah

Letter dated Dec. 1, 2000 (Exhibit B.5-13)

The Honorable Geneal Anderson, Chairperson
Paiute Indian Tribe of Utah
Tribal Council
Cedar City, Utah

Mr. Jay Banta, President
The Lincoln Highway Association
Utah Chapter
Dugway, Utah

Steve Berlin, President
The Oregon California Trail Association
Utah Crossroads Chapter
Salt Lake City, Utah

Ms. Margene Bullcreek [Letter dated Dec. 2, 2000]
Ohngo Gaudadeh Devia
Tooele, Utah

Ms. Natalie Gochnour
Utah State Planning Coordinator
Salt Lake City, Utah

The Honorable Milton Hooper, Chairman
Confederated Tribes of the Goshute Reservation
Ibapah, Utah

Mr. George Ivory, Chairman
Utah Historic Trails Consortium
Midvale, Utah

Mr. Jere Krakow, Superintendent
National Park Service Long Distance Trails Office
Salt Lake City, Utah

The Honorable Elwood Mose, Chairperson
Tribal Council of the Te-Moak Tribe
of Western Shoshone Indians of Nevada
Elko, Nevada

Mr. John D. Parkyn
Chairman of the Board
Private Fuel Storage, L.L.C.
La Crosse, Wisconsin

Mr. Jesse G. Petersen, President
The Lincoln Highway Association
Tooele, Utah

Mr. A. Stanfill
Advisory Council on Historic Preservation
Lakewood, Colorado

Letter dated Feb. 8, 2001 (Exhibit B.5-22)

The Honorable Geneal Anderson, Chairperson
Paiute Indian Tribe of Utah
Tribal Council
Cedar City, Utah

Mr. Jay Banta, President
The Lincoln Highway Association
Utah Chapter
Dugway, Utah

Steve Berlin, President
The Oregon California Trail Association
Utah Crossroads Chapter
Salt Lake City, Utah

Ms. Margene Bullcreek
Ohngo Gaudadeh Devia
Tooele, Utah

Ms. Carol Gleichman
Advisory Council on Historic Preservation
Lakewood, Colorado

Ms. Natalie Gochnour
Utah State Planning Coordinator
Salt Lake City, Utah

The Honorable Milton Hooper, Chairman
Confederated Tribes of the Goshute Reservation
Ibapah, Utah

Mr. George Ivory, Chairman
Utah Historic Trails Consortium
Midvale, Utah

Mr. Jere Krakow, Superintendent
National Park Service Long Distance Trails Office
Salt Lake City, Utah

The Honorable Elwood Mose, Chairperson
Tribal Council of the Te-Moak Tribe
of Western Shoshone Indians of Nevada
Elko, Nevada

Mr. John D. Parkyn
Chairman of the Board
Private Fuel Storage, L.L.C.
La Crosse, Wisconsin

Letter dated June 19, 2001 (Exhibit B.5-27)

The Honorable Geneal Anderson, Chairperson
Paiute Indian Tribe of Utah
Tribal Council
Cedar City, Utah

Mr. Jay Banta, President
The Lincoln Highway Association
Utah Chapter
Dugway, Utah

The Honorable Leon D. Bear, Chairman
Skull Valley Band of Goshute Indians
Salt Lake City, Utah

Steve Berlin, President
The Oregon California Trail Association
Utah Crossroads Chapter
Salt Lake City, Utah

Ms. Margene Bullcreek
Ohngo Gaudadeh Devia
Tooele, Utah

Ms. Carol Gleichman
Advisory Council on Historic Preservation
Lakewood, Colorado

Ms. Natalie Gochnour
Utah State Planning Coordinator
Salt Lake City, Utah

Mr. George Ivory, Chairman
Utah Historic Trails Consortium
Midvale, Utah

Mr. Jere Krakow, Superintendent
National Park Service Long Distance Trails Office
Salt Lake City, Utah

The Honorable Elwood Mose, Chairperson
Tribal Council of the Te-Moak Tribe
of Western Shoshone Indians of Nevada
Elko, Nevada

Mr. John D. Parkyn
Chairman of the Board
Private Fuel Storage, L.L.C.
La Crosse, Wisconsin

Mr. Jesse G. Petersen, President
The Lincoln Highway Association
Tooele, Utah

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 14, 1999

Mr. Reed Harris, Field Supervisor
U.S. Department of Interior
Fish and Wildlife Service
Utah Field Office
Lincoln Plaza, Suite 404
145 East 1300 South
Salt Lake City, Utah 84115

SUBJECT: REQUEST FOR INFORMATION REGARDING ENDANGERED SPECIES AND CRITICAL HABITATS FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Harris:

Private Fuel Storage, Limited Liability Corporation (PFS) submitted a license application, dated June 20, 1997, to the Nuclear Regulatory Commission (NRC) to receive, transfer, and possess spent nuclear fuel in an independent spent fuel storage facility (ISFSI) on the reservation of the Skull Valley Band of Goshute Indians. The PFS facility is designed for dry storage of up to 40,000 metric tons of uranium of spent fuel from U.S. commercial power reactors in approximately 4,000 sealed metal storage casks. The storage system would be passive, relying on natural convection for cooling. In addition to seeking a license from NRC, PFS is seeking rights-of-way from the U.S. Bureau of Land Management (BLM) for an Intermodal Transfer Point and a rail line to transport spent nuclear fuel to and from the ISFSI. The proposed rail line would traverse land that is included within the BLM Pony Express Resource Management Plan (RMP) which does not currently allow for major rights-of-way such as a rail line in this area. An amendment to the RMP would be required prior to granting the requested right-of-way. Also, the U.S. Bureau of Indian Affairs (BIA) must approve a proposed lease agreement between the Skull Valley Band of Goshute Indians and PFS.

Because the required actions of the three federal agencies are related, we have agreed to cooperate in the preparation of an environmental impact statement for these actions. Similarly, the agencies have also agreed to participate jointly in the consultation process required by Section 7 of the Endangered Species Act of 1973, (ESA) and other required consultations. We are requesting a list of threatened or endangered species and critical habitats within the action area to determine if there are any species or critical habitats protected by the ESA that could potentially be affected by the proposed actions. The action area is included within the geographical boundaries of Tooele County and specifically consists of the following:

1. The ISFSI site: 820 acres located in the northwest corner of the reservation in Township 5 South (T5S), Range 8 West (R8W), all of Section 6, and portions of Sections 5, 7, and 8.

2. The utility corridor and access road: 202 acres from the eastern boundary of the ISFSI site to the Skull Valley Road. The utility corridor would be located in T5S, R8W, Sections 7, 8, and 9.

Exhibit B.1-1

R. Harris - 2 -

3. The transportation routes:

   a. Rail Line: Proposed to originate at Skunk Ridge and run along the base of the Cedar Mountains to the ISFSI site. The proposed rail line would be located in T1N, R9W Sections 17, 18, 20, 21, 22, 27, and 34; T1S, R9W Sections 3, 10, 15, 22, 27, and 34; T2S R9W Sections 3, 10, 15, 22, 27, and 34; T3S, R9W Sections 3, 10, 15, 22, 27, and 34; T4S, R9W Sections 3, 10, 15, 22, 27, and 34; T5S, R9W Sections 1, 2, and 3; and T5S, R8W Section 6.

   b. Intermodal transfer point (ITP): The ITP may be used to transfer fuel from rail cars to heavy/haul trailers for shipment to the ISFSI site via Skull Valley Road. The ITP would be located approximately 1.8 miles west of the intersection of I-80 and Skull Valley Road (T1S, R8W Sections 1 and 12).

Enclosed is a map which identifies the action area.

After assessing the information provided by you, NRC, BLM, and BIA, will determine what additional actions are necessary to comply with the ESA consultation process.

If you have any questions, please contact Scott Flanders, Senior Environmental Project Manager, at (301) 415-1172.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No.: 72-22

Enclosure: As stated

cc: Service Lists

United States Department of the Interior

FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE
LINCOLN PLAZA
145 EAST 1300 SOUTH, SUITE 404
SALT LAKE CITY, UTAH 84115

U.S. Department of the Interior 1849•1999

In Reply Refer To
(CO/KS/NE/UT)

June 22, 1999

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

RE: Private Fuel Storage Facility

Dear Mr. Delligatti:

We have received your request for a list of endangered and threatened species that may occur in the area of influence of your proposed action. Below is a list of threatened, endangered, and conservation agreement species that may occur within the area of influence of your proposed action. While conservation agreement species have no legal protection under the Endangered Species Act, we ask that you try to avoid them if they are found in the area.

Common Name	Scientific Name	Status[•]
Bald Eagle[3]	*Haliaeetus leucocephalus*	T
Least Chub	*Iotichthys plegethontis*	PE
Peregrine Falcon[1]	*Falco peregrinus*	E
Ute Ladies'-tresses	*Spiranthes diluvialis*	T
Spotted Frog	Rana luteiventris	CA

• T = threatened
E = endangered
PE = proposed endangered
CA = conservation agreement species
1 = Nests in this county of Utah
3 = Wintering populations (only four known nesting pairs in Utah)

Only a Federal agency can enter into formal Endangered Species Act section 7 consultation with the Service. A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare a biological assessment by giving written notice to the Service of such a designation. The ultimate responsibility for compliance with ESA section 7, however, remains with the Federal agency.

Exhibit B.1-2

The proposed action should be reviewed and a determination made if the action would affect any listed species or their critical habitat. A determination should also be made as whether or not the action is likely to jeopardize the continued existence of proposed species or result in the destruction or an adverse modification of any critical habitat proposed for such species. If the determination is "may affect" for listed species, you must request in writing formal consultation from the Field Supervisor, at the address given above. In addition, if you determine that the proposed action is likely to jeopardize the continued existence of proposed species or result in the destruction or adverse modification of proposed critical habitat, you must confer with this office. At that time, you should provide this office a copy of the biological assessment and any other relevant information that assisted you in reaching your conclusion.

Your attention is also directed to Section 7(d) of the Endangered Species Act, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

If we can be of further assistance or if you have any questions, please feel free to contact Ted Owens of our office at (801)524-5001 extension 144.

Sincerely,

D. McGee

for Reed E. Harris
Utah Field Supervisor

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 16, 2000

Mr. Reed Harris, Field Supervisor
U.S. Department of Interior
Fish and Wildlife Service
Utah Field Office
Lincoln Plaza, Suite 404
145 East 1300 South
Salt Lake City, Utah 84115

SUBJECT: FORWARD THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY AND REQUEST FOR CONCURRENCE ON THE DETERMINATION OF EFFECT ON FEDERALLY LISTED SPECIES AND THEIR CRITICAL HABITATS

Dear Mr. Harris:

By letter dated June 14, 1999, the U.S. Nuclear Regulatory Commission (NRC), the U.S. Bureau of Indian Affairs (BIA), and the U.S. Bureau of Land Management (BLM) informed you that the three agencies are cooperating in the preparation of a draft environmental impact statement (DEIS) for an independent spent fuel storage installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians and for a rail line that would be located on land managed by the BLM and used to transport spent nuclear fuel to the proposed ISFSI. It should also be noted that a fourth Federal agency, the U.S. Surface Transportation Board (STB), is now cooperating in the preparation of the DEIS. On January 5, 2000, Private Fuel Storage, L.L.C. (PFS) submitted an application to STB requesting approval to construct and operate the aforementioned rail line. Pursuant to 49 CFR Part 1105, STB is required to prepare an environmental impact statement (EIS) as part of its review process for applications to construct and operate new rail lines.

The June 14, 1999, letter also provided a brief description of the proposed action and requested a list of threatened or endangered species and critical habitats within the action area. By letter dated June 22, 1999, you provided a list of threatened, endangered, and conservation agreement species that may occur in the area of influence of the proposed action. The letter did not indicate any designated critical habitats that might be found in the area of influence of the proposed action. On March 22, 2000, Mr. Scott Flanders of the NRC spoke with Mr. Ted Owens of your staff to confirm that the list of threatened, endangered, and conservation agreement species you provided was still appropriate for the area of influence of the proposed action. Mr. Owens noted that with the exception of the peregrine falcon (*Falco peregrinus*), which was de-listed from the Federal endangered species list (64 FR 46542, August 25, 1999), the list remained appropriate for the area of influence of the proposed action.

After a review of the potential impacts of the proposed action and consideration of the mitigation measures the cooperating agencies recommend be required for the proposed action, the cooperating agencies have determined that the effects on listed species or their designated critical habitat are expected to be discountable or insignificant, and therefore, have concluded

Exhibit B.1-3

R. Harris - 2 -

that the proposed action is not likely to adversely affect any endangered or threatened species within the area of influence of the proposed action. The supporting basis for this conclusion is included in the enclosed DEIS. Specifically, Sections 4.4, 5.4, and 6.4 discuss the environmental effects of the proposed action on ecological resources, including endangered and threatened species. The cooperating agencies are requesting your concurrence with the determination that the proposed action is not likely to adversely affect any endangered or threatened species or adversely modify any critical habitat.

If you have any questions, please contact Scott Flanders, Senior Environmental Project Manager, at (301) 415-1172.

Sincerely,

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No.: 72-22

Enclosure: DEIS

cc: Service Lists

12-22

United States Department of the Interior
FISH AND WILDLIFE SERVICE
UTAH FIELD OFFICE
LINCOLN PLAZA
145 EAST 1300 SOUTH, SUITE 404
SALT LAKE CITY, UTAH 84115

PFS Service Lists FYI.
NRC 7/21/00

In Reply Refer To
(CO/KS/NE/UT)

June 30, 2000

Mark S. Delligatti
U.S. Nuclear Regulatory Commission
Mail Stop O-13D13
Washington, D.C. 20555-0001

RE: Proposed Private Fuel Storage Facility at Skull Valley Band and Goshute Indian Reservation

Dear Mr. Delligatti:

In response to your letter of June 16, 2000, we concur with your "no effect" determination for threatened and endangered species and critical habitat. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

Only a Federal agency can enter into formal Endangered Species Act section 7 consultation with the Service. A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare a biological assessment by giving written notice to the Service of such a designation. The ultimate responsibility for compliance with ESA section 7, however, remains with the Federal agency.

We appreciate your interest in conserving endangered species. If further assistance is needed or you have any questions, please contact Larry England, at (801) 524-5001 extension 138.

Sincerely,

Reed E. Harris

Reed E. Harris
Utah Field Supervisor

This is your future. Don't leave it blank. - ***Support the 2000 Census***

Exhibit B.1-4

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 18, 1999

Mr. Max Evans
State Historic Preservation Officer
Utah State Historical Society
300 Rio Grande
Salt Lake City, Utah 84101

SUBJECT: INITIATION OF THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 PROCESS FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Evans:

Private Fuel Storage, Limited Liability Corporation (PFS) submitted a license application, dated June 20, 1997, to the Nuclear Regulatory Commission (NRC) to receive, transfer, package, and possess spent nuclear fuel in an independent spent fuel storage facility (ISFSI) on the reservation of the Skull Valley Band of Goshute Indians. In addition to receiving a license from NRC, PFS must receive a right-of-way from the U.S. Bureau of Land Management (BLM) for construction and use of a rail line over public lands to transport spent nuclear fuel to the ISFSI and approval from U.S. Bureau of Indian Affairs (BIA) for a proposed lease agreement between the Skull Valley Band of Goshute Indians and PFS. The rail line would traverse land that is included within the BLM Pony Express Resource Management Plan (RMP). The current Pony Express RMP does not allow for major right-of-ways such as a rail line in this area and would require an amendment to the RMP prior to granting the requested right-of-way.

NRC, BIA, and BLM have determined that each of these federal actions constitutes undertakings as defined in Title 36, Code of Federal Regulations (36 CFR), Section 800.2 (o). Because NRC's, BIA's, and BLM's required actions for the construction and operation of the PFS facility are related, the agencies have agreed to cooperate in the preparation of an environmental impact statement (EIS) for these actions. Similarly, the agencies have also agreed to participate jointly in the Section 106 process and other required consultations. The areas of potential effect (APE) for the three undertakings include:

1. The ISFSI site: 820 acres located in the northwest corner of the reservation in Township 5 South (T5S), Range 8 West (R8W), all of Section 6, and portions of Sections 5, 7, and 8.

2. The utility corridor and access road: 202 acres from the eastern boundary of the ISFSI site to the Skull Valley Road. The utility corridor would be located in T5S, R8W, Sections 7, 8, and 9.

3. The transportation routes:

   a. Rail Line: Proposed to originate at Skunk Ridge and run along the base of the Cedar Mountains to the ISFSI site. The proposed rail line would be located in T1N, R9W Sections 17, 18, 20, 21, 22, 27, and 34; T1S, R9W Sections 3, 10, 15, 22, 27, and 34; T2S R9W Sections 3, 10, 15, 22, 27, and 34; T3S, R9W Sections 3, 10, 15, 22, 27, and 34; T4S, R9W

Exhibit B.2-1

3, 10, 15, 22, 27, and 34; T5S, R9W Sections 1, 2, and 3; and T5S, R8W Section 6.

b. Intermodal transfer point (ITP): The ITP will be used to transfer fuel from rail cars to heavy/haul trailers for shipment to the ISFSI site via Skull Valley Road. The ITP will be located approximately 1.8 miles west of the intersection of I-80 and Skull Valley Road (T1S, R8W Sections 1 and 12).

Enclosed is a map which shows the APE.

Pursuant to 36 CFR 800.4(a) (ii), NRC, BIA, and BLM are requesting the views of the State Historic Preservation Officer on further actions to identify historic properties that may be affected by each agency's undertaking. In accordance with 36 CFR 800.4(a)(i) and (iii), a review of available information on historic properties in the APE is being conducted as part of the EIS preparation, and the agencies conducted public scoping to solicit information on environmental issues, including cultural resources, related to the PFS proposal.

After assessing the information provided by you and the information received from other interested parties, NRC, BLM, and BIA will determine if any further actions are necessary to identify historic properties under the provisions of 36 CFR 800.4 (2).

If you have any questions, please contact Scott Flanders, Senior Environmental Project Manager, at (301) 415-1172.

Sincerely,

original /s/ by

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No.: 72-22

Enclosure: As stated

cc: Service Lists

State of Utah

Department of Community and Economic Development
Division of State History
Utah State Historical Society

Michael O. Leavitt
Governor
Max J. Evans
Director

300 Rio Grande
Salt Lake City, Utah 84101-1182
(801) 533-3500 FAX: 533-3503 TDD: 533-3502
ushs@history.state.ut.us http://history.utah.org

June 24, 1999

Mark S. Dellagitti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington DC 20555-0001

RE: Initiation of the National Historic Preservation Action Section 106 Process for the Proposed Private Fuel Storage Facility

In Reply Please Refer to Case No. 97-0013

Dear Mr. Dellagitti:

The Utah State Historic Preservation Office received the above referenced letter on May 24, 1999. After consideration of NRC's request for SHPO's views concern further actions to identify historic properties that may be affected by the agencies undertaking, the Utah Preservation Office provides the following consultation in accordance with §36CFR 800.4.

1. Consultation needs to be initiated with the Hawaiian and Polynesian communities here in Utah concerning the town site at Iosepa. The site has a cemetery and historic foundations, and each Memorial Day the site is used a gathering place to celebrate a community's heritage.

2. Consultation needs to be initiated with tribes other than the Skull Valley Band of the Goshute, including the Northern Ute, Paiute, Northern Band of the Shosohoni and other Goshute Bands.

3. Lastly, consultation needs to be initiated with the Army concerning the Dugway Proving Grounds, the Skull Valley Road is one of two major access routes to the base.

Preserving and Sharing Utah's Past for the Present and Future

Exhibit B.2-2

As specific survey designs are developed to address potential cultural resources in the area of potential effect, the USHPO will comment on the proposed identification methods. This information is provided on request to assist the Nuclear Regulatory Commission with its Section 106 responsibilities as specified in §36CFR80 If you have questions, please contact Jim Dykmann at (801) 533-3555.

Sincerely,

Wilson G. Martin
Deputy State Historic Preservation Officer

JLD:97-0013 OFR

F:\CULTURAL\JIM\97-0013.wpd

c: Connie Nakahara, Utah Dept. Of Environmental Quality

c: John Harja, Governors Office

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 9, 1999

Mr. Max Evans
State Historic Preservation Officer
Utah State Historical Society
300 Rio Grande
Salt Lake City, Utah 84101

SUBJECT: NATIONAL HISTORIC PRESERVATION ACT SECTION 106 PROCESS FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Evans:

On September 1, 1999, members of the U.S. Nuclear Regulatory Commission (NRC) staff and representatives of the U.S. Bureau of Indian Affairs (BIA) and the U.S. Bureau of Land Management (BLM) met with Mr. Jim Dykman of your office to discuss your response to the NRC, BLM, and BIA May 18, 1999, letter initiating the Section 106 process for the proposed Private Fuel Storage Facility (PFSF). During the meeting, it was noted that the Advisory Council on Historic Preservation (Council) recently revised the implementing regulations (36 CFR Part 800) for the Section 106 process. The revised regulations became effective June 17, 1999, and were published in the Federal Register, 64 FR 27043, May 18, 1999. Since the Section 106 process for PFSF was initiated prior to the effective date of the revised regulations, there is some flexibility in the version of the regulations that can be used to complete the consultation. At the meeting, the NRC staff and representatives of BLM and BIA thought it appropriate to use the revised regulations. However, we agreed to further review the issue and to provide a final position.

The NRC, BIA, and BLM have reviewed, in greater detail, the Council's guidance (copy enclosed) regarding the use of the revised regulations for cases already in progress. In its guidance, the Council states "Even if an agency has initiated the Section 106 process prior to June 17, 1999, the revised regulations should be applied unless circumstances strongly warrant completing the process under the former regulations." The Council's guidance includes four factors, listed below, that should be considered in deciding which regulations should be used to complete the process.

- How long ago did the agency initiate the process?

  If the process was initiated so long ago that the agency might have reasonably expected that the former regulations would apply, it might make sense to continue to apply those regulations.

- How far into the process is the case?

  If a case has been nearly completed under the former regulations, it might be more expedient to complete the process under the former regulations. If the process has only begun, the revised regulations should be applied.

- Will continued application of the former regulations create any delay, expense, or hardship?

Exhibit B.2-3

M. Evans

November 9, 1999
- 2 -

If so, it is more reasonable to apply the revised regulations.

- Will continuing to use the former regulations deprive any party (e.g. THPO, other tribes, applicants, local governments) or the public of an opportunity to participate?

If so, the revised regulations should apply.

After considering these factors, the NRC, BIA, and BLM believe it is appropriate to use the revised regulations. The initiation of the Section 106 process began with the NRC, BLM, and BIA letter to you on May 18, 1999. Given that the process began recently, we believe that the revised regulations can be effectively implemented without a delay in the process. Furthermore, NRC, BIA, and BLM believe that the revised regulations would require that the Skull Valley Band of Goshute Indians be included as a consulting party for the portions of the area of potential effect that is on tribal land. Continued use of the existing regulations could deprive the Band of an opportunity to participate in the Section 106 process in the same capacity. Inclusion of the Band in the process as a consulting party is consistent with the intent of the 1992 amendment to the National Historic Preservation Act (NHPA) which placed major emphasis on the role of Indian tribes and other Native Americans in the Section 106 process. Also, we believe including the Band as a consulting party more appropriately reflects the NRC, BIA, and BLM's commitment to government-to-government relations with Indian tribes.

We welcome your response to this position on the use of the revised regulations, and look forward to working with your office to complete the Section 106 process. If you have any questions about this letter, please contact me at (301) 415-8518, or the NRC Environmental Project Manager, Scott Flanders, at (301) 415-1172.

Sincerely,

(Original Signed by:)

Mark S. Delligatti, Senior Project Manager
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: Section 106 Regulations Users Guide

cc: Service Lists

ACHP 106

Section 106 Regulations Users Guide
6. Transition Questions and Answers

Introduction

The Advisory Council on Historic Preservation has revised the regulations that implement Section 106 of the National Historic Preservation Act. Published in the *Federal Register* (64 FR 27043-27084) May 18, 1999, the revised regulations went into effect June 17, 1999. This briefing sheet addresses expected questions during the transition from the former regulations to the revised ones.

The regulation revisions are the culmination of careful Council review of the Section 106 process, which was last amended in 1986. This review reaffirmed the basic tenets of the Section 106 process, while introducing new flexibility and options for agencies to meet their legal obligations. The process continues to focus on constructive resolution of potential conflicts between a Federal undertaking and historic properties through consultation and agreement among the agency, the State or Tribal Historic Preservation Officer

(SHPO/THPO), and the Council.

1. Are existing Memoranda of Agreement and Programmatic Agreements still valid?

Yes. Memoranda of Agreement (MOAs) and Programmatic Agreements (PAs) executed under the former regulations are still valid. The revised regulations contain changes to the process by which agreements will be developed and executed after June 17, 1999.

2. What interpretation applies to provisions in Memoranda of Agreement and Programmatic Agreements executed before the effective date of the new regulations that refer to the former regulations by section numbers?

When the parties to existing MOAs and PAs entered into those agreements, the former regulations were in place. By referring to sections of those regulations, the signatories expressed their intent to be bound by the terms of the regulations existing at the time the agreements were executed.

Unless a particular MOA or PA expressly states that the most current version of the regulations is to apply, each MOA or PA must be interpreted under the version of the regulations that was current at the time the agreement was executed. If an MOA or PA states that the most current version of the regulations is to govern the agreement's terms, then the revised regulations should be used. Few, if any, agreements contain such a provision.

Under both the former and the revised regulations and under most MOAs and PAs, signatories are entitled to seek amendment to the agreement. Thus, if a signatory is unhappy with a reference to a section of the former regulations or its interpretation, that party would be free to seek amendment to bring the MOA or the PA under the revised regulations.

However, except in a highly unusual situation, it is anticipated that amendments will be pursuant to the revised regulations. In addition, all the signatories to the original document must agree to the amendment.

3. How are existing MOAs and PAs to be interpreted that do not specifically refer to a section of the former regulations but refer instead to the Council's regulations in a general manner?

By including in the Memoranda of Agreement a general reference to the Council's regulations rather than a specific reference, the parties agreed to a general process and not to specific steps as might be contained in a particular section or subsection of the former regulations.

This sort of general reference is often seen in stipulations in MOAs that require the agency to seek the comments of the Council under 36 CFR Part 800 if the provisions of the MOA cannot be met. Although it could be shown that the parties intended the processes contained in the former regulations to apply, it is more reasonable to assume that the most current process is applicable. Therefore, new consultation required by such general references, including that occurring in the context of an MOA, should be conducted under the revised regulations.

Again, parties may seek amendment of MOAs or PAs to clarify any ambiguities.

4. Under what regulations must cases in progress be handled?

Even if an agency has initiated the Section 106 process prior to June 17, 1999, the revised regulations should be applied unless circumstances strongly warrant completing the process under the former regulations. This approach should not cause delay in completing the Section 106 process.

Generally, regarding cases in progress when the revised regulations go into effect, it will be assumed that the revised regulations apply unless the consulting parties agree to the contrary. The parties should consider the following factors in deciding which regulations to use to complete the process:

- How long ago did the agency initiate the process? If the process was initiated so long ago that the agency might have reasonably expected that the former regulations would apply, it might make sense to continue to apply those regulations.
- How far into the process is the case? If a case has been nearly completed under the former regulations, it might be more expedient to complete the process under the former regulations. If the process has only begun, the revised regulations should be applied.
- Will continued application of the former regulations create any delay, expense, or hardship? If so, it is more reasonable to apply the revised regulations.

- Will continuing to use the former regulations deprive any party (e.g. THPO, other tribes, applicants, local governments) or the public of an opportunity to participate? If so, the revised regulations should apply.

If the Agency Official, SHPO, and Council cannot agree, then the revised regulations should apply.

5. How are Memoranda of Agreement prepared under the former regulations to be executed when they are received by the Council after June 17, 1999?

When agreements that have been prepared under the former regulations come to the Council for consideration and signature, the Council will assume that the revised regulations apply to its own actions with regard to those agreements. The Council will treat them as MOAs under §800.6(b)(2) of the revised regulations, requiring the Council's signature.

Although the appropriate documentation required by the revised regulations should be submitted, the Council will apply the documentation requirements flexibly when, in its estimation, circumstances so warrant.

6. If it is decided that the former regulations are to be used for one purpose under an MOA or a PA, is use of the revised regulations precluded for another purpose in the same MOA or PA?

Although it is preferable to apply only one set of regulations to any given MOA or PA, there may be circumstances in which it would be more reasonable to apply both the former and the revised regulations for different purposes. For example, when an existing MOA or PA refers to a specific section of the former regulations and it is clear that the parties intended the particular terms of that section to apply, then the specified section of the former regulations may be used.

The same MOA or PA may also require the parties to seek Council comment when the terms of the agreement cannot be met. For this second reference, the revised regulations would apply. (See answer to question #3.)

7. To what address must case materials be sent?

All case materials developed under the regulations should be sent to the Director, Office of Planning and Review. Materials for cases originating in localities east of the Mississippi River, as well as in Minnesota, Iowa, and Missouri, should be sent to ACHP, 1100 Pennsylvania Ave., NW, Suite 809, Washington, DC 20004. Materials for cases originating west of the Mississippi River (exclusive of Minnesota, Iowa, and Missouri) should be sent to ACHP, 12136 W. Bayaud Ave., Suite 330, Lakewood, CO 80228.

Summary

Specific references to sections of the former regulations in existing agreements should be interpreted under the version of the regulations that existed at the time the agreement was executed, unless the MOA or PA contains a provision to the contrary or the signatories agree that the MOA or PA should be interpreted under the revised regulations. General references to the Council's regulations in existing MOAs or PAs should be interpreted as references to the revised regulations unless the MOA clearly indicates otherwise.

Cases in progress generally should follow the revised regulations. However, the consulting parties, who began consultation before the effective date of the new regulations, and having considered all pertinent factors, may agree to complete the process under the former regulations. Such agreement should be in writing and should state the reasons for the decision.

The Council staff is available to answer any questions and provide guidance on application of the regulations in specific circumstances. For questions related to the regulations, call (202) 606-8508, or e-mail regs@achp.gov.

Return to top of page

State of Utah
Department of Community and Economic Development
Division of State History
Utah State Historical Society

UTAH STATE HISTORICAL SOCIETY

Michael O. Leavitt
Governor
Max J. Evans
Director

300 Rio Grande
Salt Lake City, Utah 84101-1182
(801) 533-3500 FAX: 533-3503 TDD: 533-3502
ushs@history.state.ut.us http://history.utah.org

November 23, 1999

Mark S. Delligatti, Senior Project Manager
Licensing Section
Spent Fuel Project Office
Office of Nuclear Safety and Safeguards
Nuclear Regulatory Commission
Washington DC 20555-001

RE: Proposed Private Fuel Storage Facility – Skull Valley, Utah

In Reply Please Refer to Case No. 97-0013

Dear Mr. Delligatti:

The Utah State Historic Preservation Office received the above referenced request on November 16, 1999. After review of the material provided, the Utah Preservation Office understands that this project will proceed pursuant to the revised regulations for Section 106 Compliance.

This information is provided on request to assist with Section 106 responsibilities as specified in §36CFR800. If you have questions, please contact Jim Dykmann at (801) 533-3555. His email address is: jdykman@history.state.ut.us

Sincerely,

Wilson G. Martin
Deputy State Historic Preservation Officer

JLD:97-0013 OFR

Preserving and Sharing Utah's Past for the Present and Future

Exhibit B.2-4

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 6, 2000

Max Evans, Director
Utah State Historic Preservation Office
300 South Rio Grande
Salt Lake City, Utah 84101

SUBJECT: REQUEST FOR CONCURRENCE ON ELIGIBILITY DETERMINATIONS FOR THE ARCHEOLOGICAL AND HISTORIC SITES IDENTIFIED WITHIN THE AREA OF POTENTIAL EFFECT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Evans:

By letter dated May 18, 1999, the Nuclear Regulatory Commission (NRC), the Bureau of Land Management (BLM), and the Bureau of Indian Affairs (BIA), initiated consultation as required by Section 106 of the National Historic Preservation Act (NHPA) for the proposed Private Fuel Storage (PFS) facility. In the letter, NRC, BIA, and BLM described the proposed project, the area of potential effect (APE), and each Federal agency's required action. The Federal agencies also requested, pursuant to 36 CFR 800.4(a)(ii), the views of the Utah State Historic Preservation Officer with regard to further actions that could be taken by the Federal agencies to identify historic properties. By letter dated June 24, 1999, you responded and identified several additional actions the Federal agencies could take to identify historic properties. Your letter also noted that you would comment on the identification methods of future cultural resource surveys within the APE. It should be noted that since the May 18, 1999, letter, the Surface Transportation Board (STB) has agreed to cooperate in the preparation of the Environmental Impact Statement (EIS) and required consultation activities such as those required by Section 106 of the NHPA. The STB must approve construction of the proposed rail line from Skunk Ridge, Utah, to the proposed PFS facility.

In May and June of 1999 and in June 2000, a PFS contractor, P-III Associates, performed a Class III cultural resources inventory in Skull Valley, Utah. All portions of the APE were included in the study area. At the request of the BLM, PFS will provide you with a copy of the report documenting the cultural resource inventory. For all sites within the APE, the report includes a recommendation with regard to each site's eligibility for inclusion in the National Register of Historic Places. The Federal agencies have reviewed the report and concur with the eligibility recommendations for all archeological and historic sites within the APE. Enclosed is a list of sites and their eligibility recommendation. The Federal agencies request your concurrence, within 30 days, on the determination of eligibility following the recommendations in the report.

The Federal agencies are meeting with consulting parties to discuss the eligibility recommendations included in the report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the APE. The Federal agencies are scheduled to meet with Mr. Jim Dykmann of your staff on October 24, 2000. After meeting with the

Exhibit B.2-5

M. Evans -2-

consulting parties, the Federal agencies will prepare a treatment plan and Memorandum of Agreement (MOA) for your review and the review of other signatories to the MOA.

If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson-Ball (STB) at (202) 565-1539.

Sincerely,

Scott Flanders for

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: List of Sites and Eligibility Recommendations

cc: Service Lists

Eligibility Recommendations for sites within the APE for the proposed PFS Facility

Site Number	Site Name	NRHP Status
42TO709	Emigrant Trail/Hastings Cutoff	Eligible
42TO1187	Rock alignment and cairns	Unevaluated
42TO1343	Buried AT&T telephone line	Not Eligible
42TO1409	U.S. Route 40	Eligible
42TO1410	"New" Victory Highway	Eligible
42TO1411	"Old" Victory Highway	Eligible
42TO1412	Western Union telegraph line	Eligible
42TO1413	Western Pacific Railroad	Eligible
42TO1414	Historic habitation/gas station	Not Eligible
42TO1415	Gas Station	Not Eligible
42TO1416	Road to Deep Creek	Eligible
42TO1417	Road to Sulphur Spring or Eight-Mile Spring	Eligible

Enclosure

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

1975 25 years 2000

October 19, 2000

Max Evans, Director
Utah State Historic Preservation Office
300 South Rio Grande
Salt Lake City, Utah 84101

SUBJECT: CONSULTATION UNDER SECTION 106 NATIONAL HISTORIC PRESERVATION ACT OF 1966

Dear Mr. Evans:

By letter dated October 6, 2000, the Nuclear Regulatory Commission (NRC) staff, the Bureau of Land Management (BLM), the Bureau of Indian Affairs (BIA), and the Surface Transportation Board (STB) requested your concurrence on the eligibility determinations under the National Historic Preservation Act (NHPA) in the P-III Associates report for the proposed Private Fuel Storage facility. As stated in the letter, representatives of the NRC staff, BLM, BIA, and STB were scheduled to meet with Mr. Jim Dykmann of your staff on October 24, 2000, to discuss the eligibility recommendations and potential mitigation measures for anticipated adverse impacts to cultural resources within the area of potential effect. On October 10, 2000, Mr. Dykmann canceled the meeting, and on October 13, 2000, Ms. Lynette Lloyd, of your staff, informed Mr. Scott Flanders, of the NRC staff, that all future consultation activity regarding the proposed Private Fuel Storage facility should be conducted with the Utah Governor's office.

Pursuant to 36 C.F.R. Part 800, Federal agencies should consult with the State Historic Preservation Officer (SHPO), and shall follow the procedures for initiating and performing such consultation. The term SHPO as defined in 36 C.F.R. § 800.16 is "the official appointed or designated pursuant to section 101(b)(1) of the [NHPA] to administer the State historic preservation program or a representative designated to act for the State Historic Preservation Officer." In light of your cancellation of the meeting scheduled for October 24, 2000, and your instruction to us to communicate with the Governor's office regarding this matter, it appears to us that you are withdrawing from the Section 106 consultation process. Please confirm, in writing, within 15 days of the date of this letter, whether you are withdrawing from the consultation process or are continuing to consult. If you are continuing to consult, please identify in your confirmation letter the identity of the SHPO or the representative designated to act for the SHPO, with whom we should communicate regarding this matter, and that person's address and telephone number. If we do not hear from you within 15 days, we will assume that you have withdrawn from the Section 106 consultation process for the Private Fuel Storage proposal.

Sincerely,

Scott Flanders for

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Exhibit B.2-6

STATE OF UTAH
OFFICE OF THE GOVERNOR
SALT LAKE CITY
84114-0601

MICHAEL O. LEAVITT
GOVERNOR

OLENE S. WALKER
LIEUTENANT GOVERNOR

November 1, 2000

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
United State Nuclear Regulatory Commission
Washington DC 20555-0001

RE: Request for Consultation under Section 106, National Historic Preservation Act, 1966, Docket No. 72-22

In Reply Please Refer to Section 106 Case No. 97-0013

Dear Mr. Delligatti:

For the purpose of consultation regarding the Private Fuel Storage Project in Skull Valley, Tooele County, Utah, I retain the authority of the State Historic Preservation Officer, and have assigned Natalie Gochnour, State Planning Coordinator, Room 116, State Capitol, Salt Lake City, Utah 84114 , (801) 538-1027, to be the contact on this project. This retention of authority is applicable to this project only.

Sincerely,

Michael O. Leavitt

Michael O. Leavitt
Governor

c: Scott Flanders, Spent Fuel Licensing Section, Licensing and Inspection Directorate, Spent Fuel Project Office, Office of Nuclear Material Safety and Safeguards, United State Nuclear Regulatory Commission, Washington DC 20555-0001

c: Max J. Evans, Utah State Historic Preservation Officer

Note: Postmarked 11/15/00
Recvd by VLT 11/20/00

Exhibit B.2-7

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 5, 2000

The Honorable Michael O. Leavitt
Governor of the State of Utah
Office of the Governor
Salt Lake City, UT 84114-0601

SUBJECT: YOUR LETTER DATED NOVEMBER 1, 2000

Dear Governor Leavitt:

I am responding to your November 1, 2000, letter, which was postmarked November 15, 2000, and which I received November 20, 2000, informing us that you have retained the authority of the State Historic Preservation Officer (SHPO) for the proposed Private Fuel Storage, L.L.C. (PFS) project, and that you have appointed Ms. Natalie Gochnour, Utah State Planning Coordinator, to serve as the SHPO contact person on this project.

We appreciate your clarification of the roles of the previously appointed SHPO and the Utah State Planning Coordinator for the proposed PFS project. I understand from your letter that the State of Utah now has two SHPOs: (1) Michael O. Leavitt, Governor of the State of Utah, with respect to the PFS project, and (2) Max J. Evans, the previously appointed Utah SHPO, for all other projects.

The U.S. Nuclear Regulatory Commission staff and the cooperating Federal agencies (the U.S. Department of Interior's Bureau of Land Management and Bureau of Indian Affairs and the Surface Transportation Board) wish to express our gratitude to Mr. Jim Dykmann of the staff of the Utah SHPO, who has served as our contact in the consultation process up until this point. Mr. Dykmann conducted himself in a thoroughly professional manner and was very responsive. We look forward to a similar relationship with Ms. Gochnour for the remainder of this consultation process.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

cc: PFS EIS Service List
Natalie Gochnour, Utah State Planning Coordinator
Max J. Evans, Utah State Historic Preservation Officer
Jim Dykmann, Utah State Historic Preservation Office

Exhibit B.2-8

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 5, 2000

Ms. Natalie Gochnour
Utah State Planning Coordinator
Room 116 State Capitol
Salt Lake City, UT 84114

SUBJECT: YOUR APPOINTMENT AS CONTACT PERSON FOR THE STATE HISTORIC PRESERVATION OFFICER FOR THE PRIVATE FUEL STORAGE, L.L.C. PROJECT

Dear Ms. Gochnour:

In his November 1, 2000, letter (which was postmarked November 15, 2000 and which I received November 20, 2000), Governor Michael O. Leavitt informed me that he has retained authority as the State Historic Preservation Officer (SHPO) for the proposed Private Fuel Storage, L.L.C. (PFS) project and that you have been appointed to serve as the SHPO's contact person for this project.

The U.S. Nuclear Regulatory Commission (NRC) staff and the cooperating Federal agencies (the U.S. Department of Interior's Bureau of Land Management and Bureau of Indian Affairs and the Surface Transportation Board) congratulate you on your appointment, and we look forward to working with you in the future.

Prior to your appointment as the PFS project contact person for the Utah SHPO, the NRC staff and cooperating Federal agencies had been interacting with Mr. Jim Dykmann of the staff of the Utah SHPO on matters associated with the State of Utah's participation in the consultation process required by Section 106 of the National Historic Preservation Act.

During the period in which the previously appointed Utah SHPO had authority for the PFS project, several determinations and findings were made, including: determination of the area of potential effect (APE), identification of the historic properties within the APE, identification of consulting parties, and determination of whether the historic sites within the APE are eligible for inclusion on the National Register of Historic Places. Also, the cooperating Federal agencies notified the Advisory Council on Historic Properties that construction and operation of the facilities associated with the proposed PFS project would have an adverse effect on cultural properties within the APE. As a result of this determination, the cooperating Federal agencies met with several of the consulting parties to solicit their views regarding potential mitigation measures. The Utah SHPO declined to meet with the cooperating Federal agencies to discuss recommended eligibility determinations and potential mitigation measures for the sites within the APE. Also, neither the Governor of Utah, the Utah SHPO, nor any other State official responded within 30 days to the NRC staff's letter dated October 6, 2000, requesting concurrence on the recommendations for eligibility (see enclosure). Therefore, the findings and determinations which have been made are considered final (see 36 CFR 800.3(c)(4)). The cooperating Federal agencies have proceeded to the next step in the consultation process. A draft Memorandum of Agreement (Agreement) has been developed and will be circulated to

Exhibit B.2-9

N. Gochnour -2-

the consulting parties for comment. In view of your recent appointment by Governor Leavitt, a copy of the draft Agreement will be provided to you. We trust that the Utah SHPO has forwarded all previous reports and correspondence related to the proposed PFS project to you.

If you any questions related to the consultation process, please contact Mr. Scott Flanders of the NRC staff at (301) 415-1172.

Sincerely,

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: 10/06/00 ltr to Utah SHPO

cc: PFS EIS Service List
The Honorable Michael O. Leavitt, Governor of the State of Utah

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 22, 2000

Mr. Don Klima, Director
Office of Planning and Review
Advisory Council on Historic Preservation
12136 West Vayaud Avenue
Room 300
Lakewood, Colorado 80228

SUBJECT: NOTIFICATION OF IMPACT TO CULTURAL RESOURCES FROM THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Klima:

Private Fuel Storage, L.L.C. (PFS), a limited liability company owned by eight utilities, proposes to construct and operate an independent spent fuel storage installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians. The Reservation is located 27 miles south-southwest of Tooele, Utah. The ISFSI would be located on an 820 acre-site in the northwest corner of the Reservation, approximately 3.5 miles from the tribal village. PFS would use dry storage technology to store as much as 40,000 metric tons of uranium of spent nuclear fuel (SNF).

PFS proposes to transport the SNF to the Reservation by rail. Currently, the closest rail line is 24 miles north of the Reservation. Therefore, to transport the SNF solely by rail, PFS proposes the construction and operation of a rail line from this existing rail line to the proposed site. The proposed rail line would be located along the western edge of Skull Valley and extend from Skunk Ridge (near Low, Utah) to the ISFSI site on the Reservation. The proposed rail line would be 32 miles long and would traverse only land managed by the U.S. Bureau of Land Management (BLM).

The PFS proposal requires approval from four federal agencies: the U.S. Nuclear Regulatory Commission (NRC), the U.S. Bureau of Indian Affairs (BIA), BLM, and the Surface Transportation Board (STB). PFS has requested the following approvals: an NRC license to receive, transfer, and possess the SNF; BIA's approval of a 25-year lease between PFS and the Skull Valley Band; STB's approval for the construction and operation of the proposed rail line; and approval for a right-of-way from the BLM for construction and use of the proposed rail line over public lands. The rail line would traverse land that is managed within the BLM Pony Express Resource Management Plan (RMP). The current Pony Express RMP does not allow for major rights-of-way such as a rail line in this area and would require an amendment to the RMP prior to granting the requested right-of-way.

The NRC, in cooperation with BIA, BLM, and STB, has published a Draft Environmental Impact Statement (DEIS) regarding the PFS proposal. The four Federal agencies are also participating jointly in the Section 106 process and other required consultations. Based on the review documented in the DEIS, the four Federal agencies have determined that the proposed rail line would adversely affect the Hastings Cutoff Trail, a cultural resource that is considered eligible for the National Register of Historic Places. Also, the proposed rail line would affect other resources that have not yet been fully evaluated to determine their cultural significance.

Exhibit B.3-1

D. Klima - 2 -

Construction and operation of the proposed ISFSI would not affect any cultural resources on the Reservation.

Enclosed for your review is a copy of the DEIS. Cultural resources are discussed in DEIS Sections 3.6, 4.6, 5.6, and 6.6. Through the consultation process, the four Federal agencies will develop a Memorandum of Agreement (MOA) with the Utah State Historic Preservation Officer (SHPO).

Pursuant to the requirements of 36 CFR 800.6(a)(1), the four Federal agencies are notifying the Council of the adverse effect to the Hastings Cutoff Trail and are providing a copy of the DEIS as documentation of their review and findings to date. The four Federal agencies are also providing the DEIS to the Advisory Council on Historic Preservation (the Council) because the proposed action involves the Reservation of the Skull Valley Band of Goshute Indians. The agencies recognize that one of the four criteria considered by the Council in determining whether to enter the consultation process (described in Appendix A to 36 CFR Part 800) is the effect of the proposed action on Indian tribes and Native Hawaiian organizations. Consultation with the Utah SHPO has been initiated. Also, the cooperating agencies have offered Indian tribes and other organizations, that may be concerned with the possible effects of the proposed action on historic properties, an opportunity to participate in the Section 106 consultation process. Pursuant to 36 CFR 800.6(b)(1)(iv), a copy of the executed MOA will be submitted to the Council.

If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Harold McNulty (STB) at (202) 565-1539.

Sincerely,

Scott Flanders for

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: DEIS

cc w/o encl: Service Lists

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 12136 West Bayaud Avenue, #330
Lakewood, Colorado 80226

June 28, 2000

Mr. Mark S. Delligatti
Senior Project Manager
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

RE: *Notification of Impact to Cultural Resources From the Proposed Private Fuel Storage Facility on the Reservation of the Skull Valley Band of Goshute Indians*

Dear Mr. Delligatti:

On June 27, 2000, we received your notification and supporting documentation regarding the adverse effect of the referenced project on properties eligible for inclusion in the National Register of Historic Places. Based upon the information you provided and the criteria included in Appendix A of our regulations, "Protection of Historic Properties" (36 CFR Part 800), we do not believe that our participation in the consultation to resolve adverse effects is needed. However, should circumstances change and you determine that our participation is required, please notify us.

Pursuant to 36 CFR 800.6(b)(iv), you will need to file the final Memorandum of Agreement (MOA), developed in consultation with the Utah State Historic Preservation Officer (SHPO), and related documentation at the conclusion of the consultation process. The filing of this MOA with the Council is required in order for the NRC to complete its compliance responsibilities under Section 106 of the National Historic Preservation Act.

Thank you for providing us with your notification of adverse effect. If you have any questions, please contact Alan Stanfill at 303/969/5110 or via eMail at astanfill@achp.gov.

Sincerely,

Lee Keatinge

Lee Keatinge
Program Analyst
Western Office of Planning and Review

Exhibit B.3-2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 27, 2000

Mr. Alan Stanfill
Advisory Council on Historic Preservation
12136 West Bayaud Avenue, #330
Lakewood, CO 80226

SUBJECT: SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED PRIVATE FUEL STORAGE PROJECT

Dear Mr. Stanfill:

As you are aware, Private Fuel Storage, L.L.C. (PFS), proposes to construct and operate an independent spent fuel storage installation on the Reservation of the Skull Valley Band of Goshute Indians, a Federally-recognized Indian Tribe. The U.S. Nuclear Regulatory Commission (NRC), the U.S. Department of Interior's Bureau of Indian Affairs (BIA) and Bureau of Land Management (BLM), and the Surface Transportation Board (STB) have agreed to participate jointly in the consultation process required by Section 106 of the National Historic Preservation Act. By letter dated June 28, 2000, you acknowledged notification and supporting documentation regarding the adverse effect of the project on properties eligible for inclusion on the National Register of Historic Places. Furthermore, you stated that pursuant to 36 CFR 800.6(b)(iv), the cooperating Federal agencies would need to file a final Memorandum of Agreement (Agreement), developed in consultation with the Utah State Historic Preservation Officer (SHPO), and related documentation at the conclusion of the consultation process. This is required in order for the cooperating Federal agencies to fully comply with Section 106 of the National Historic Preservation Act (NHPA).

By letter dated October 6, 2000, the cooperating Federal agencies requested the Utah SHPO's concurrence on the eligibility recommendations and mitigation measures within 30 days (Enclosure 1). During the week of October 23-27, 2000, the cooperating Federal agencies met with consulting parties to discuss the eligibility recommendations contained in the PFS Class III cultural resource inventory report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the area of potential effects (APE). The cooperating Federal agencies scheduled an October 24, 2000, meeting with the previously designated representative of the Utah SHPO's office to discuss the eligibility recommendations and mitigation measures. However, on October 10, 2000, representatives from the SHPO's office canceled the meeting, and on October 13, 2000, Ms. Lynette Lloyd of the SHPO's staff informed Mr. Scott Flanders of the NRC staff that all future consultation activities regarding the PFS project should be conducted with the Utah Governor's office. By letter dated October 19, 2000, the cooperating Federal agencies requested clarification of the SHPO's role in the consultation process (Enclosure 2). On November 20, 2000, I received a letter dated November 1, 2000, from Utah Governor Michael O. Leavitt in which he indicated that, for the PFS project, he was retaining ". . . the authority of the State Historic Preservation Officer . . ." for purposes of consultation under Section 106 of the NHPA (Enclosure 3).

Exhibit B.3-3

A. Stanfill -2-

Based on the unique circumstances associated with the State's participation in the consultation project, the cooperating Federal agencies request the participation of the Advisory Council on Historic Preservation in the Section 106 consultation process for the PFS proposal.

If you have any further questions or comments regarding this request, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson Ball (STB) at (202) 565-1530.

Thank you for your consideration.

Sincerely,

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosures:
1. 10/06/2000 ltr to UT State Historic Preservation Offc.
2. 10/19/2000 ltr to UT State Historic Preservation Offc.
3. 11/01/2000 ltr fr Governor Michael O. Leavitt

cc: EIS Service List
Natalie Gochnour

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 12136 West Bayaud Avenue, #330
Lakewood, Colorado 80226

DEC 18 2000

Mr. Mark S. Delligatti
Senior Project Manager
Licensing and Inspection Directorate
Office of Nuclear Material Safety and Safeguards
United State Nuclear Regulatory Commission
Washington, D.C. 20555

REF: *Section 106 of the National Historic Preservation Act for the Proposed Private Fuel Storage Project on the Reservation of the Skull Valley Band of Goshute Indians*

Dear Mr. Delligatti:

On December 4, 2000, the Council received the Nuclear Regulatory Commission's notification regarding the proposed private fuel storage project on the reservation of the Skull Valley Band of Goshute Indians, and invitation to participate in consultation to resolve its adverse affects on properties eligible for listing in the National Register of Historic places. In accordance with 36 CFR §800.6(a)(1) of the Council's regulations, "Protection of Historic Properties" (36 CFR Part 800, the Council has concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases,* is met because of the controversy surrounding this project and the potential procedural problems that may be encountered with the reassignment of State Historic Preservation Officer's responsibilities within the Utah Governor's Office. The Council, therefore, will participate in this consultation.

We have also provided written notification, copy enclosed, of the Council's decision to enter the consultation on this project to Chairman Richard Meserve, as required by 36 CFR §800.6(a)(1)(iii).

Exhibit B.3-4

2

We look forward to consulting with your agency, and other consulting parties to resolve adverse effects resulting from the Private Fuel Storage Project. Should you have any questions or wish to discuss this matter further, please contact Alan Stanfill at (303) 969-5110, or via e-mail at astanfill@achp.gov.

Sincerely,

Don L. Klima
Director
Office of Planning and Review

Enclosure

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

DEC 18 2000

Honorable Richard A. Meserve
Chairman
Nuclear Regulatory Commission
Washington, DC 20555

Dear Chairman Meserve:

On December 4, 2000, the Council received the Nuclear Regulatory Commission's notification regarding the proposed private fuel storage project on the reservation of the Skull Valley Band of Goshute Indians, and invitation to participate in consultation to resolve its adverse affects on properties eligible for listing in the National Register of Historic places. In accordance with 36 CFR §800.6(a)(1) of the Council's regulations, "Protection of Historic Properties" (36 CFR Part 800, the Council has concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases,* is met because of the controversy surrounding this project and the potential procedural problems that may be encountered with the reassignment of State Historic Preservation Officer's responsibilities within the Utah Governor's Office. The Council, therefore, will participate in this consultation.

We have also provided written notification, copy enclosed, of the Council's decision to enter the consultation on this project to the Licensing and Inspection Directorate, as required by 36 CFR §800.6(a)(1)(iii).

We look forward to consulting with your agency, and other consulting parties to resolve adverse effects resulting from the Private Fuel Storage Project. Should you have any questions or wish to discuss this matter further, please contact Alan Stanfill at (303) 969-5110, or via e-mail at astanfill@achp.gov.

Sincerely,

John M. Fowler
Executive Director

Enclosure

READING

JUL 0 1 1999

8111/2800
(UT-023)

Certified Mail #Z 155 815 989
Return Receipt Requested

Attn: Chairperson
Northwestern Band of Shoshoni Nation
Blackfoot, Idaho 83221-0637

Dear Chairperson:

The Bureau of Land Management (BLM) Salt Lake Field Office is considering an application by Private Fuel Storage to construct a railroad line along the west side of Skull Valley to a proposed nuclear storage site on the Goshute Indian Reservation. The proposed railroad would require an amendment to the Pony Express Resource Management Plan to allow a right-of-way outside of a designated corridor. The BLM is cooperating with the Nuclear Regulatory Commission (NRC) and the Bureau of Indian Affairs (BIA) in preparing an environmental impact statement for the proposed project.

If you would like further information about this project, or if you would like to be a consulting party in the process of compliance with the National Historic Preservation Act, please call Archeologist Laird Naylor at (801) 977-4357.

Sincerely,

LEON E. BERGGREN
for
Glenn A. Carpenter
Field Manager

Exhibit B.4-1

CONFEDERATED TRIBES
of the
GOSHUTE RESERVATION
P.O. BOX 6104
IBAPAH, UTAH 84034
PHONE: (435) 234-1138
FAX: (435) 234-1162

July 9, 1999

Glenn Carpenter
Bureau of Land Management
Salt Lake District Office
2370 S. 2300 W.
Salt Lake City, UT 84119

Re: Consultation request for Skull Valley EIS
Dear Mr. Carpenter:

I had received your letter informing us of Skull Valley Band of Goshute's intent to build a railway through Skull Valley. Now, our current informal agreement with Skull Valley delegates them as contact on the consultation process in accordance with NEPA. This agreement has Skull Valley acting as a contact and in turn informing us of the status of consultation and status of EA(s) and EIS(s). We feel now that with the EIS to be conducted for their monitored retrievable storage project that we are to be involved within the consultation process. We feel compelled to review the EIS as this is not only their aboriginal territory but to all Goshute people.

If you wish to contact me feel free to call at the above number or 435/234-1168.

Respectfully,

Milton J. Hooper
Interim Chair, Goshute Business Council

Exhibit B.4-2

FILE SURNAME
ZN

DEC 28 1999

8111
(UT-023)

Mr. Ronald Wopsock, Chair
The Ute Indian Tribe
P.O. Box 190
Fort Duchense, Utah 84026-0190

Dear Mr. Wopsock: and others, see attached list

The archeological survey for the Private Fuel Storage facility and railroad in Skull Valley is now complete. Several historic sites have been located which will be impacted by the railroad. First, on the west side of the valley, is the Hastings Cutoff of the California National Historic Trail. This section of the trail survives as a linear depression with excellent integrity of both the physical feature and the surrounding landscape. Other historic features have been located in Low Pass including an abandoned section of US Highway 40 with multiple alignments, a possible alignment of the Victory/Lincoln Highway, the railroad, a possible telegraph line and a historic telephone line. The railroad, telephone , and possibly also the telegraph lines are also present at the Intermodal Transfer Point. We are in the process of consulting to determine the significance of these features and the most appropriate means of mitigating the impacts of this undertaking.

For the nationally significant Hastings Cutoff, the BLM is tentatively proposing archeological documentation of the entire trail segment across Skull Valley as mitigation. This is appropriate, as the historic landscape of the entire segment will be affected. This segment reaches from the BLM property boundary near Hope Wells on the southeast to Redlum Spring on the west. Proposed documentation would include description of trail characteristics and condition by subsegments of like condition, description of all associated features or artifacts, continuous black-and-white photography, and mapping of the entire segment using the Global Positioning System (GPS).

Please contact Archeologist Laird Naylor at (801) 977-4357 or at the above address if you would like to be a consulting party on this project or if you have any concerns or comments on this process. Topics for which comments are specifically being solicited at this point include recommendations for the proposed mitigation, and assistance in documenting any other historic properties which might be affected by the project.

Sincerely,

William Dragt

for Glenn A. Carpenter
Field Office Manager

Exhibit B.4-3

UTAH CROSSROADS

OREGON-CALIFORNIA TRAILS ASSOCIATION
3026 Metropolitan Way
Salt Lake City, Utah 84109
(801) 484-9623

January 6, 2000

Glenn A. Carpenter
Bureau of Land Management
Salt Lake City Field Office
2370 South 2300 West
Salt Lake City, UT 84119

RE: 8111 (UT-023) Jan 03 2000 and 8152 (UT-023) Dec 28 1999.

Dear Mr. Carpenter:

Thank you for keeping us in the loop on these projects. We do have some definite concerns when it comes to disrupting historic sites. We realize that you folks are doing your best to mitigate the situation and appreciate your efforts.

We would like very much to be involved as a consulting party on these projects. We do have concerns and would like to comment on this process.

Please notify the following of any meetings or comment sessions that come up.

Steve Berlin
Oregon-California Trails Association
5211 Greenpine Dr.
Salt Lake City, UT 84123

Albert Mulder
Oregon-California Trails Association
6098 South 520 East
Murray, UT 84107

Roy Tea
Oregon-California Trails Association
2881 East Pamela Dr.
Salt Lake City, UT 84121

Exhibit B.4-4

Vern Gorzitze
Oregon-California Trails Association
3026 Metropolitan Way
Salt Lake City, UT 84109

Jesse Petersen
Lincoln Highway Association
56 Benchmark Village
Tooele, UT 84074

I am sure that the above named people could offer some constructive and informative help, as well as insight, to you study group.

As you mentioned the Hastings Cutoff of the California National Historic Trail, is of great significance and value to our western heritage as are the Lincoln and Victory Highways.

Thank you again for informing us and offering the chance for some input.

Respectfully,

Vern Gorzitze

cc Laird Naylor
Bureau of Land Management
Salt Lake Field Office
2370 South 2300 West
Salt Lake City, UT 84119

STEPHEN L. CARR, M.D.
2801 E. 5140 SOUTH
HOLLADAY, UTAH 84117
(801) 277-7711
FAX 272-8579

January 28, 2000

Re: 8152 (UT-023) and 8111 (UT-023)

Glenn A. Carpenter
Field Office Manager
BLM
2370 S. 2300 West
Salt Lake City, Utah 84119

Dear Mr. Carpenter,

The two letters referenced above, addressed to Lester Tippie, President of the Promontory Chapter of the National Railway Historical Society, have been given to me, as railroad historian, to reply.

Regarding #8152, we are aware of various encroachments that will occur when the new rail line is constructed. Of necessity, older existing trails, highways, etc., will be breached in one form or other. I suppose you do what you need to to mitigate as much destruction as is possible in such instances. Other than that, this Chapter takes no position on the route or obstacles that may be presented by construction. We will be interested in the final location of the rail line and its usage.

Regarding #8111, the mentioned railroad bed of the Salt Lake & Western RR through 5-mile Pass has been utilized as a ranch road, ORV road, etc., almost since its abandonment as a rail line. It has not suffered any more from such activity than from normal erosion. It is no more historical than any number of other such abandoned grades, possibly just more visible. The Pony Express route and the old telegraph line would be harder to define because of the lack of specific construction and grading.

Again, the Chapter takes no position on whatever must be done to segregate ORV use in the proposed SRMA. We would simply ask that, wherever possible, when the rail grade is used or crossed (the Pony Express and telegraph routes, as well), that your BLM signs be placed to tell the traveler or visitor what the grading, etc., had been used for in the past.

Thanks for your interest in our Chapter's concern in regard to these projects.

Respectfully,

Stephen L. Carr, M.D.

SLC:ms

Exhibit B.4-5

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001
April 26, 2000

The Honorable Ronald Wopsock, Chairman
The Ute Indian Tribe
P.O. Box 190
Ft. Duchense, Utah 84026-0190

SUBJECT: NATIONAL HISTORIC PRESERVATION ACT CONSULTATION PROCESS FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Chairman Wopsock:

By letters dated July 1, and December 28, 1999, the U.S. Bureau of Land Management (BLM) informed you that it is considering an application for a proposed rail line along the western side of Skull Valley. The proposed rail line would start at Skunk Ridge and extend along the eastern side of the Cedar Mountains to a proposed independent spent fuel storage facility (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians. BLM indicated that the proposed rail line would require an amendment to the BLM Pony Express Resource Management Plan and extended an opportunity for you to be a consulting party in the process of compliance with the National Historic Preservation Act (NHPA). In addition to the amendment to the BLM Pony Express Resource Management Plan, the proposed project (the ISFSI and rail line) would require federal approvals from the U.S. Nuclear Regulatory Commission (NRC), the U.S. Bureau of Indian Affiars (BIA), and the U.S. Surface Transportation Board (STB). Because the agencies' required actions for the construction and operation of the proposed project are related, the agencies agreed to cooperate in the preparation of an environmental impact statement (EIS) for these actions. Similarly, the agencies also agreed to participate jointly in the Section 106 process and other required consultations. NRC, BIA, and STB also would like to extend an opportunity for you to participate as a consulting party in the process of compliance with the NHPA. If you have already expressed your desire to participate in the NHPA consultation process, you need not respond to this letter unless you have decided to no longer participate.

Enclosed is a map which shows the proposed location of the rail line and the ISFSI. Specifically, the areas for the proposed project include:

1. The ISFSI site: 820 acres located in the northwest corner of the reservation in Township 5 South (T5S), Range 8 West (R8W), all of Section 6, and portions of Sections 5, 7, and 8.

2. The utility corridor and access road: 202 acres from the eastern boundary of the ISFSI site to the Skull Valley Road. The utility corridor would be located in T5S, R8W, Sections 7, 8, and 9.

3. Rail Line: Proposed to originate at Skunk Ridge and run along the base of the Cedar Mountains to the ISFSI site. The proposed rail line would be located in T1N, R9W Sections 17, 18, 20, 21, 22, 27, and 34; T1S, R9W Sections 3, 10,

Exhibit B.4-6

Chairman Wopsock - 2 - April 26, 2000

15, 22, 27, and 34; T2S R9W Sections 3, 10, 15, 22, 27, and 34; T3S, R9W Sections 3, 10, 15, 22, 27, and 34; T4S, R9W Sections 3, 10, 15, 22, 27, and 34; T5S, R9W Sections 1, 2, and 3; and T5S, R8W Section 6.

If you have any questions about the proposed project or would like to participate in the NHPA consultation process for any aspect of the proposed project, please contact Scott Flanders of the NRC at (301) 415-1172; Garry Cantley of the BIA at (602) 379-6750; Laird Naylor of the BLM at (801) 977-4357; or Harold McNulty of the STB (202) 565-1539. Written request to participate as a consulting party can be sent to:

Scott Flanders, Environmental Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop O-13D13
Washington D.C. 20555-0001

Garry Cantley, Archeologist
U.S. Bureau of Indian Affairs
Phoenix Area Office
P.O. Box 10
Phoenix, AZ 85001

Laird Naylor, Archeologist
U.S. Bureau of Land Management
Salt Lake District Office
2370 South 2300 West
Salt Lake City, UT 84119

Harold McNulty, Project Manager
U.S. Surface Transportation Board
Section of Environmental Analysis
1925 K Street NW, 5th Floor
Washington, DC 20423

Sincerely,

Mark Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: Map

cc: Service Lists

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 13, 2000

Ms. Marjean Bullcreek
Ohngo Gaudadeh Devia
P.O. Box 155
Tooele, UT 84074

SUBJECT: NATIONAL HISTORIC PRESERVATION ACT CONSULTATION PROCESS FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Ms. Bullcreek:

As you are aware, Private Fuel Storage, L.L.C. (PFS), a limited liability company owned by eight utilities, proposes to construct and operate an independent spent fuel storage installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians, a Federally-recognized Indian Tribe. PFS would use dry storage technology to store as much as 40,000 metric tons of uranium of spent nuclear fuel (SNF).

PFS proposes to transport the SNF to the Reservation by rail. Currently, the closest rail line is 24 miles north of the Reservation. Therefore, to transport the SNF solely by rail, PFS proposes the construction and operation of a rail line from this existing rail line to the proposed site. The proposed rail line would be located along the western edge of Skull Valley and extend from Skunk Ridge (near Low, Utah) to the ISFSI site on the Reservation. The proposed rail line would be 32 miles long and would traverse only land managed by the U.S. Bureau of Land Management (BLM).

The U.S. Nuclear Regulatory Commission (NRC), in cooperation with the U.S. Bureau of Indian Affairs (BIA), BLM, and the Surface Transportation Board (STB), has published a Draft Environmental Impact Statement (DEIS) regarding the PFS proposal. The cooperating agencies have offered Indian tribes and other organizations, that may be concerned with the possible effects of the proposed action on historic properties, an opportunity to participate in the Section 106 consultation process. This process allows identification of consulting parties, identification of historic properties and assessment of the effects of the proposed action on such properties, and consultation regarding the effects of the proposed action on historic properties with Indian tribes that might attach religious and cultural significance to affected historic properties.

In accordance with 36 CFR 800.2(c)(6), certain individuals and organizations with a demonstrated interest in the undertaking may participate as consulting parties because of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties. In order to determine your organization's eligibility to participate in the Section 106 consultation process, we request that you provide information regarding cultural resources that you believe will be affected by the construction and operation of the proposed ISFSI or rail line. Specifically, we are requesting the following information:

(1) awareness of or concern for any prehistoric or historic district, site, building, structure, or object eligible for inclusion on the National Register of Historic Places, or

Exhibit B.4-7

M. Bullcreek 2 September 13, 2000

(2) awareness of or concern for properties of traditional religious and cultural significance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria as defined in 36 CFR Part 60.

If you have any questions or comments regarding this request, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson Ball (STB) at (202) 565-1539. A response within 30 days of receipt of this letter is appreciated. Thank you for your assistance.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

cc: M. Evans, State Historic Preservation Officer

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 5, 2000

Ms. Margene Bullcreek
Ohngo Gaudadeh Devia
P.O. Box 155
Tooele, UT 84074

SUBJECT: SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT CONSULTATION PROCESS FOR THE PROPOSED PRIVATE FUEL STORAGE PROJECT

Dear Ms. Bullcreek:

As you are aware, Private Fuel Storage, Limited Liability Company (PFS), proposes to construct and operate an independent spent fuel storage installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians, a Federally recognized Indian Tribe. The U.S. Nuclear Regulatory Commission (NRC), the U.S. Department of Interior's Bureau of Indian Affairs (BIA) and Bureau of Land Management (BLM), and the Surface Transportation Board (STB) agreed to participate jointly in the consultation process required by Section 106 of the National Historic Preservation Act.

By letter dated September 13, 2000, the cooperating Federal agencies requested information from Ohngo Gaudadeh Devia (OGD) on (1) the awareness of, or concern for, any prehistoric or historic district, site, building, structure, or object eligible for inclusion on the National Register of Historic Places, or (2) the awareness of, or concern for, properties of traditional religious and cultural significance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria as defined in 36 CFR Part 60. On October 11, 2000, you contacted Scott Flanders, of the NRC staff, and requested a 2-week extension to file your comments. Mr. Flanders agreed to your request. Upon the passage of three additional weeks, the NRC staff and representatives of the BIA and BLM contacted representatives of OGD and arranged a telephone conference call. This conference call was held on November 9, 2000. Its purpose was to solicit information regarding cultural resources that OGD believes will be affected by the construction and operation of the proposed facility or the rail line in order to determine OGD's eligibility to participate in the consultation process. Enclosure 1 is a summary of the content of the conference call.

We appreciate your organization's contribution to the process by your suggestions, such as considering potential artifacts within the Area of Potential Effect (APE). As discussed during the conference call, a Class III cultural resources inventory was performed on the Reservation and in Skull Valley, Utah. All portions of the APE were included in the study area. At your request, a copy of the Class III cultural resources report documenting the cultural resource inventory is enclosed (Enclosure 2). Site location information contained in the Class III cultural resources report may not be released to the general public under federal law, and it is essential that this information be protected.

Exhibit B.4-8

M. Bullcreek 2

As you will see in the Class III cultural resources report and in the Draft Environmental Impact Statement (Page 4-38), no properties or use of culturally important natural resources of traditional religious and cultural significance to an Indian tribe or Native Hawaiian organization have been identified. The cooperating Federal agencies recognize that unanticipated discovery of cultural properties can occur once construction of the project has begun. Therefore, the cooperating Federal agencies have agreed to include a provision in a Treatment Plan for covering the entire APE, to deal with any unanticipated discovery of cultural properties or culturally important natural resources of traditional religious and cultural significance to a Federally recognized Indian tribe or Native Hawaiian organization.

Notwithstanding the cooperating Federal agencies' determination that the substantive information OGD provided reflected issues that were already being considered as a part of the Section 106 consultation process, the cooperating Federal agencies have agreed that OGD should be included as a consulting party to the Section 106 consultation process.

The cooperating Federal agencies appreciate your forthright statement that you do not believe that you have the expertise to make determinations of cultural resources within the APE and that you would defer to the judgment of elders of the Confederated Tribes of the Goshute Reservation. Please be aware that elders of the Confederated Tribes of the Goshute Reservation have been consulted in this regard and that the Confederated Tribes of the Goshute Reservation have also been granted consulting party status (see Enclosure 3).

If you have any questions or comments regarding this request, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson Ball (STB) at (202) 565-1530.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosures:
1. Minutes of the 11/9/00 Teleconference
2. Class III Cultural Resources Inventory Report
3. Ltr dtd 11/20/00 to the Confederated Tribes of the Goshute Reservation

cc: EIS Service List
Natalie Gochnour, Utah State Planning Coordinator

MINUTES OF THE NOVEMBER 9, 2000, TELECONFERENCE WITH OHNGO GAUDADEH DEVIA ON THE NATIONAL HISTORIC PRESERVATION ACT CONSULTATION PROCESS FOR THE PROPOSED PRIVATE FUEL STORAGE PROJECT

Participants:

Name:	**Organization:**
Margene Bullcreek, Principal	Ohngo Gaudadeh Devia
Samuel Shepley, Attorney	Ohngo Gaudadeh Devia
Mark Delligatti, Senior Project Manager	NRC
Scott Flanders, Senior Project Manager	NRC
Melanie Wong, Project Manager	NRC
Laird Naylor, Archeologist	BLM - Salt Lake Field Office
Steve Simpson, Attorney	BIA
Paul Nickens, Archeologist	Pacific Northwest National Laboratory

The teleconference began at 12:00 p.m., EST. Mr. Flanders stated that the purpose of the teleconference was to solicit information regarding cultural resources that Ohngo Gaudadeh Devia (OGD) believes will be affected by the project. This information is solicited to determine whether OGD is eligible to participate in the National Historic Preservation Act consultation process.

By letter dated September 13, 2000, the cooperating Federal agencies had requested information from OGD on (1) the awareness of, or concern for, any prehistoric or historic district, site, building, structure, or object eligible for inclusion on the National Register of Historic Places, or (2) the awareness of, or concern for, properties of traditional religious and cultural significance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria as defined in 36 CFR Part 60. Ms. Bullcreek confirmed that OGD had not responded to the September 13, 2000, letter and had requested an extension of time. Mr. Flanders asked if OGD was now ready to state its position on the cultural resources within the Area of Potential Effect (APE) to be provided to the cooperating Federal agencies. While Ms. Bullcreek noted that the organization was not aware of any historic structures located in the APE, she stated that the project would have irreversible effects. She further stated that she believed that the project could potentially disturb artifacts, cemeteries and campsites, and medicinal plants (e.g., sagebrush and other plants she could not identify at this time). In addition, she stated her belief that the proposed project would impact a sacred underground artesian watercourse involved in ceremonial purification. Ms. Bullcreek also stated that she believed that the air and animals were sacred and that they too would be disturbed. A botanical survey was requested by Ms. Bullcreek.

Mr. Flanders and Mr. Naylor disclosed that a Class III cultural resource inventory of the APE had been performed and that a copy of the report would be forwarded to the organization. Ms. Bullcreek stated that she was not qualified to make such determinations of cultural resources within the APE and that she preferred to defer to the tribal elders, particularly those of the Confederated Tribes of the Goshute Reservation. Mr. Flanders stated that the cooperating Federal agencies had consulted with the Confederated Tribes of Goshute Reservation (specifically with Mr. Ken Williams, Chairman Milton Hooper's appointed representative). Ms. Bullcreek indicated that, in her opinion, Mr. Williams was not an acceptable representative.

Mr. Flanders indicated that the cooperating Federal agencies would consider the information that OGD had provided and decide whether OGD would be granted consultation status.

The teleconference concluded at approximately 12:45 p.m. EST.

Enclosure 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 16, 2000

The Honorable Elwood Mose, Chairman
Tribal Council of the Te-Moak
Western Shoshone Indians of Nevada
525 Sunset Street
Elko, Nevada 89801

SUBJECT: REQUEST FOR CONCURRENCE ON ELIGIBILITY DETERMINATIONS FOR THE ARCHEOLOGICAL AND HISTORIC SITES IDENTIFIED WITHIN THE AREA OF POTENTIAL EFFECT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Chairman Mose:

By letter dated July, 1, 1999, and April 26, 2000, the U.S. Nuclear Regulatory Commission (NRC), the U.S. Bureau of Indian Affairs (BIA), the U.S. Bureau of Land Management (BLM), and the Surface Transportation Board (STB) extended opportunities for you to participate in the National Historic Preservation Act Section 106 consultation process for the Private Fuel Storage facility. During a follow-up call with the NRC on September 25, 2000, you indicated that your tribe would like to participate in the consultation process. As a part of the consultation process, we are providing you with a copy of the Class III cultural resource inventory report prepared by a Private Fuel Storage contractor, P-III Associates (Enclosure 1). The inventory was performed in May and June of 1999 and in June 2000, and the study area covered all portions of the area of potential effect (APE). For all sites within the APE, the report includes a recommendation with regard to each site's eligibility for inclusion in the National Register of Historic Places. We have reviewed the report and concur with the eligibility recommendations for all archeological and historic sites within the APE. Enclosure 2 is a list of sites and their eligibility recommendation. We request your concurrence, within 30 days, on the eligibility recommendations in the report.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe or Native Hawaiian organization have been identified. The Federal agencies are interested in knowing if you have specific knowledge of any properties within the APE that you attach traditional religious and cultural significance to, or awareness of or concern for any prehistoric or historic district, site, building, structure, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure the property can be appropriately considered in the Section 106 process.

We are meeting with consulting parties to discuss the eligibility recommendations included in the report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the APE. We are scheduled to meet with you on October 23, 2000. It is our understanding that you will be representing the three Councils of the Te-Moak Western Shoshone. After meeting with the consulting parties, we will prepare a treatment plan and Memorandum of Agreement (MOA) for your review and concurrence.

Exhibit B.5-1

Chairman Mose -2-

We look forward to meeting with you in late October. If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson-Ball (STB) at (202) 565-1539.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosures:
1. Class III Cultural Resource Inventory Report
2. List of Sites and Eligibility Recommendations

cc: Service Lists
Max Evans, Utah State Historic Preservation Officer
Marvin McDade, Ch., South Fork Band Council
Wilbur Woods, Ch., Elko Band Council
Helen Dave, Environmental Coordinator
Nevada Penoli, Ch., Wells Indian Colony Band Council
Lydia Sam, Ch., Battle Mountain Band Council

Eligibility Recommendations for sites within the APE for the proposed PFS Facility

Site Number	Site Name	NRHP Status
42TO709	Emigrant Trail/Hastings Cutoff	Eligible
42TO1187	Rock alignment and cairns	Unevaluated
42TO1343	Buried AT&T telephone line	Not Eligible
42TO1409	U.S. Route 40	Eligible
42TO1410	"New" Victory Highway	Eligible
42TO1411	"Old" Victory Highway	Eligible
42TO1412	Western Union telegraph line	Eligible
42TO1413	Western Pacific Railroad	Eligible
42TO1414	Historic habitation/gas station	Not Eligible
42TO1415	Gas Station	Not Eligible
42TO1416	Road to Deep Creek	Eligible
42TO1417	Road to Sulphur Spring or Eight-Mile Spring	Eligible

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 16, 2000

The Honorable Milton J. Hooper, Chairman
Confederate Tribes of the Goshute Reservation
P.O. Box 6104
Ibapah, Utah 84034

SUBJECT: REQUEST FOR CONCURRENCE ON ELIGIBILITY DETERMINATIONS FOR THE ARCHEOLOGICAL AND HISTORIC SITES IDENTIFIED WITHIN THE AREA OF POTENTIAL EFFECT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Chairman Hooper:

By letter dated July, 9, 1999, you informed the U.S. Bureau of Land Management (BLM) that the Confederate Tribes of the Goshute Reservation would like to participate in the National Historic Preservation Act Section 106 consultation process for the Private Fuel Storage facility. The Nuclear Regulatory Commission (NRC), the Bureau of Indian Affairs (BIA), BLM, and the Surface Transportation Board (STB) are cooperating in the Section 106 consultation process. As a part of the consultation process, we are providing you with a copy of the Class III cultural resource inventory report prepared by a Private Fuel Storage contractor, P-III Associates (Enclosure 1). The inventory was performed in May and June of 1999 and in June 2000, and the study area covered all portions of the area of potential effect (APE). For all sites within the APE, the report includes a recommendation with regard to each site's eligibility for inclusion in the National Register of Historic Places. We have reviewed the report and concur with the eligibility recommendations for all archeological and historic sites within the APE. Enclosure 2 is a list of sites and their eligibility recommendation. We request your concurrence, within 30 days, on the eligibility recommendations in the report.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe or Native Hawaiian organization have been identified. The Federal agencies are interested in knowing if you have specific knowledge of any properties within the APE that you attach traditional religious and cultural significance to, or awareness of or concern for any prehistoric or historic district, site, building, structure, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure the property can be appropriately considered in the Section 106 process.

We are meeting with consulting parties to discuss the eligibility recommendations included in the report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the APE. We are scheduled to meet with you on October 23, 2000. After meeting with the consulting parties, we will prepare a treatment plan and Memorandum of Agreement (MOA) for your review and concurrence.

Exhibit B.5-2

Chairman Hooper -2-

We look forward to meeting with you in late October. If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson-Ball (STB) at (202) 565-1539.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosures: 1. Class III Cultural Resource Inventory Report
2. List of Sites and Eligibility Recommendations

cc: Service Lists
Max Evans, Utah State Historic Preservation Officer

Eligibility Recommendations for sites within the APE for the proposed PFS Facility

Site Number	Site Name	NRHP Status
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42TO1411	"Old" Victory Highway	Eligible
42TO1412	Western Union telegraph line	Eligible
42TO1413	Western Pacific Railroad	Eligible
42TO1414	Historic habitation/gas station	Not Eligible
42TO1415	Gas Station	Not Eligible
42TO1416	Road to Deep Creek	Eligible
42TO1417	Road to Sulphur Spring or Eight-Mile Spring	Eligible

Enclosure 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 16, 2000

The Honorable Leon D. Bear, Chairman
Skull Valley Band of Goshute Indians
2480 South Main, No. 110
Salt Lake City, UT 84115

SUBJECT: REQUEST FOR CONCURRENCE ON ELIGIBILITY DETERMINATIONS FOR THE ARCHEOLOGICAL AND HISTORIC SITES IDENTIFIED WITHIN THE AREA OF POTENTIAL EFFECT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Chairman Bear:

As a part of the consultation process, we are providing you with a copy of the Class III cultural resource inventory report prepared by a Private Fuel Storage contractor, P-III Associates (Enclosure 1). The inventory was performed in May and June of 1999 and in June 2000, and the study area covered all portions of the area of potential effect (APE). For all sites within the APE, the report includes a recommendation with regard to each site's eligibility for inclusion in the National Register of Historic Places. We have reviewed the report and concur with the eligibility recommendations for all archeological and historic sites within the APE. Enclosure 2 is a list of sites and their eligibility recommendation. We request your concurrence, within 30 days, on the eligibility recommendations in the report.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe or Native Hawaiian organization have been identified. The Federal agencies are interested in knowing if you have specific knowledge of any properties within the APE that you attach traditional religious and cultural significance to, or awareness of or concern for any prehistoric or historic district, site, building, structure, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure the property can be appropriately considered in the Section 106 process.

We are meeting with consulting parties to discuss the eligibility recommendations included in the report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the APE. We are scheduled to meet with you on October 25, 2000. After meeting with the consulting parties, we will prepare a treatment plan and Memorandum of Agreement (MOA) for your review and concurrence.

Exhibit B.5-3

Chairman Bear -2-

We look forward to meeting with you in late October. If you have any questions, please contact Scott Flanders (Nuclear Regulatory Commission) at (301) 415-1172, Laird Naylor (Bureau of Land Management) at (801) 977-4357, Garry Cantley (Bureau of Indian Affairs) at (602) 379-6750, or Phillis Johnson-Ball (Surface Transportation Board) at (202) 565-1539.

Sincerely,

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosures: 1. Class III Cultural Resource Inventory Report
2. List of Sites and Eligibility Recommendations

cc: Service Lists
Max Evans, Utah State Historic Preservation Officer

Eligibility Recommendations for sites within the APE for the proposed PFS Facility

Site Number	Site Name	NRHP Status
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42TO1413	Western Pacific Railroad	Eligible
42TO1414	Historic habitation/gas station	Not Eligible
42TO1415	Gas Station	Not Eligible
42TO1416	Road to Deep Creek	Eligible
42TO1417	Road to Sulphur Spring or Eight-Mile Spring	Eligible

Enclosure 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 16, 2000

Jay Banta, President
The Lincoln Highway Association
Utah Chapter
PO Box 568
Dugway, Utah 84022

SUBJECT: REQUEST FOR CONCURRENCE ON ELIGIBILITY DETERMINATIONS FOR THE ARCHEOLOGICAL AND HISTORIC SITES IDENTIFIED WITHIN THE AREA OF POTENTIAL EFFECT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Banta:

In May and June of 1999 and in June 2000, a Private Fuel Storage (PFS) contractor, P-III Associates, performed a Class III cultural resources inventory of the area of potential effect (APE) in Skull Valley, Utah. All portions of the APE were included in the study area. At the request of the Bureau of Land Management (BLM), PFS will provide you with a copy of the report documenting the cultural resource inventory. For all sites within the APE, the report includes a recommendation with regard to each site's eligibility for inclusion in the National Register of Historic Places. The Federal agencies, the Nuclear Regulatory Commission (NRC), the BLM, the Bureau of Indian Affairs (BIA), and the Surface Transportation Board (STB), have reviewed the report and concur with the eligibility recommendations for all archeological and historic sites within the APE. Enclosed is a list of sites and their eligibility recommendation. The Federal agencies request your concurrence, within 30 days, on the eligibility recommendations in the report.

We are meeting with consulting parties to discuss the eligibility recommendations included in the report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the APE. A meeting was held with the Utah Trails Organizations on July 27, 2000. During that meeting, several members of the Utah Trails Organizations provided input on possible mitigation measures for the areas adversely impacted by the PFS proposal. However, if after reviewing this report, you have additional information you would like to provide, please contact one of the four Federal agencies. After meeting with the consulting parties, we will prepare a treatment plan and Memorandum of Agreement (MOA) for your review and concurrence.

Exhibit B.5-4

J. Banta -2-

If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson-Ball (STB) at (202) 565-1539.

Sincerely,

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: List of Sites and Eligibility Recommendations

cc: Service Lists
Max Evans, Utah State Historic Preservation Officer

Eligibility Recommendations for sites within the APE for the proposed PFS Facility

Site Number	**Site Name**	**NRHP Status**
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Enclosure 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 16, 2000

Jere Krakow, Superintendent
National Park Service
Long Distance Trails Office
324 South State Street
Suite 250, PO Box 45155
Salt Lake City, Utah 84145-0155

SUBJECT: REQUEST FOR CONCURRENCE ON ELIGIBILITY DETERMINATIONS FOR THE ARCHEOLOGICAL AND HISTORIC SITES IDENTIFIED WITHIN THE AREA OF POTENTIAL EFFECT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Krakow:

In May and June of 1999 and in June 2000, a Private Fuel Storage (PFS) contractor, P-III Associates, performed a Class III cultural resources inventory of the PFS area of potential effect (APE) in Skull Valley, Utah. All portions of the APE were included in the study area. At the request of the Bureau of Land Management (BLM), PFS will provide you with a copy of the report documenting the cultural resource inventory. For all sites within the APE, the report includes a recommendation with regard to each site's eligibility for inclusion in the National Register of Historic Places. The Federal agencies, the Nuclear Regulatory Commission (NRC), the BLM, the Bureau of Indian Affairs (BIA), and the Surface Transportation Board (STB), have reviewed the report and concur with the eligibility recommendations for all archeological and historic sites within the APE. Enclosed is a list of sites and their eligibility recommendation. The Federal agencies request your concurrence, within 30 days, on the eligibility recommendations in the report.

We are meeting with consulting parties to discuss the eligibility recommendations included in the report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the APE. A meeting was held with the Utah Trails Organizations on July 27, 2000. During that meeting, you provided input on possible mitigation measures for the areas adversely impacted by the PFS proposal. However, if after reviewing this report, you have additional information you would like to provide, please contact one of the four Federal agencies. After meeting with the consulting parties, we will prepare a treatment plan and Memorandum of Agreement (MOA) for your review and concurrence.

Exhibit B.5-5

J. Krakow -2-

If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson-Ball (STB) at (202) 565-1539.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: List of Sites and Eligibility Recommendations

cc: Service Lists
Max Evans, Utah State Historic Preservation Officer

Eligibility Recommendations for sites within the APE for the proposed PFS Facility

Site Number	Site Name	NRHP Status
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42TO1415	Gas Station	Not Eligible
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42TO1417	Road to Sulphur Spring or Eight-Mile Spring	Eligible

Enclosure 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 16, 2000

Richard Poulsen
Iosepa Historical Society
West Valley UT Branch 01
4416 Bordeaux
West Valley, Utah 84120

SUBJECT: NATIONAL HISTORIC PRESERVATION ACT CONSULTATION PROCESS FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Poulsen:

By letters dated July 1, 1999, and April 26, 2000, the Nuclear Regulatory Commission (NRC), the Bureau of Indian Affairs (BIA), the Bureau of Land Management (BLM), and the Surface Transportation Board (STB) informed you of the Private Fuel Storage, L.L.C. (PFS) proposal that includes the construction and operation of an independent spent fuel storage installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians, and the construction and operation of a rail line from the existing rail line to the proposed site. The proposed rail line would be located along the western edge of Skull Valley and extend from Skunk Ridge (near Low, Utah) to the ISFSI site on the Reservation. In the letters, the Federal agencies also offered you an opportunity to participate in the National Historic Preservation Act Section 106 consultation process.

Although you have informed Laird Naylor of the BLM that you do not want to participate as a consulting party in the Section 106 process, the Federal agencies are interested in knowing if you have specific knowledge of any prehistoric or historic district, site, building, structure, or object eligible for inclusion on the National Register of Historic Places, or awareness of or concern for properties of traditional religious and cultural significance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria as defined in 36 CFR Part 60.

If you have any questions or comments regarding this request, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA)

Exhibit B.5-6

R. Poulsen -2-

at (602) 379-6750, or Phillis Johnson Ball (STB) at (202) 565-1539. A response within 30 days of receipt of this letter is appreciated. Thank you for your assistance.

Sincerely,

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

cc: M. Evans, State Historic Preservation Officer

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 16, 2000

The Honorable Ronald Wopsock, Chairman
Northern Ute
P.O. Box 190
Ft. Duchesne, Utah 84026-0190

SUBJECT: NATIONAL HISTORIC PRESERVATION ACT CONSULTATION PROCESS FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Chairman Wopsock:

By letters dated July 1, 1999, and April 26, 2000, the Nuclear Regulatory Commission (NRC), the Bureau of Indian Affairs (BIA), the Bureau of Land Management (BLM), and the Surface Transportation Board (STB) informed you of the Private Fuel Storage, L.L.C. (PFS) proposal that includes the construction and operation of an independent spent fuel storage installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians, and the construction and operation of a rail line from the existing rail line to the proposed site. The proposed rail line would be located along the western edge of Skull Valley and extend from Skunk Ridge (near Low, Utah) to the ISFSI site on the Reservation. In the letters, the Federal agencies also offered you an opportunity to participate in the National Historic Preservation Act Section 106 consultation process.

Although you have not indicated whether you want to participate as a consulting party in the Section 106 process, the Federal agencies are interested in knowing if you have specific knowledge of any prehistoric or historic district, site, building, structure, or object eligible for inclusion on the National Register of Historic Places, or awareness of or concern for properties of traditional religious and cultural significance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria as defined in 36 CFR Part 60.

If you have any questions or comments regarding this request, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA)

Exhibit B.5-7

Chairman Wopsock -2-

at (602) 379-6750, or Phillis Johnson Ball (STB) at (202) 565-1539. A response within 30 days of receipt of this letter is appreciated. Thank you for your assistance.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

cc: M. Evans, State Historic Preservation Officer

October 25, 2000

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Office of Nuclear Safety and Safeguards

Dear Mr. Delligatti:

This letter is to inform you that the Utah State Chapter of the Lincoln Highway Association does concur with the findings of eligibility for the National Register of Historic Places for sites 42T01410 and 42T01411 in conjunction with the cultural resources review for the Private Fuels Storage railline.

I would, however, offer the following argument that site 42T01410 is eligible under both criterion A and criterion B in regard to the significance statement used for eligibility determinations. I believe that P-III either failed to assess the background information required to make this determination or perhaps, failed to recognize that there were several individuals associated the "New" Victory Highway who are significant at either the state or national level.

You may be aware that the construction of this highway was bitterly opposed by the Lincoln Highway Association as being far too expensive when some improvement of the existing route in primary use at that time (of course the Lincoln Highway) could result in a nearly all season route for far less capital investment. This battle was fought by several of the Directors of the Lincoln Highway Association, many of whom were some of the most important individuals in the expansion of automobile travel and touring in American history. Among those directly involved in lobbying at both the state and national level against the construction of this road were: J. Newton Gunn, Vice President of the U. S. Rubber Company; Frank Sieberling, President of the Goodyear Tire and Rubber Co.; Henry Joy, President of the Packard Motorcar Company.

The acrimonious debate eventually resulted in an hearing with then U.S. Secretary of Agriculture Henry C. Wallace in Washington D.C. Included at this meeting, were the following players, many of whom are certainly "heavyweights" from a state or national viewpoint. Nevada Senator Oddie, Senator King of Utah, Utah Governor Charles Mabey and ex-governor Spry.

The ultimate outcome of this hearing was, of course, that the route for the Victory Highway was to become the focus of Federal funding for the major roadway to cross western Utah at that time.

I believe that this debate was a final kink in the less-than-positive relationship between the Lincoln Highway Association and Utah politicians and highway officials. After this point, up until it ceased activity in 1928, the Lincoln Highway Association spent very little effort on the Utah portion of the Lincoln Highway.

Exhibit B.5-8

I would certainly entertain a rebuttal of this argument should you reached the opinion that this property is not eligible under criterion B. I do believe that being found eligible under multiple criteria becomes significant if, and when, any nominations are forwarded for action.

Sincerely

Jay Banta

Jay Banta, President
Utah State Chapter
Lincoln Highway Association

cc: Jess Petersen, President Lincoln Highway Association

"A CONTINUOUS CONNECTING IMPROVED HIGHWAY FROM THE ATLANTIC TO THE PACIFIC"

LINCOLN HIGHWAY

LINCOLN L HIGHWAY

THE LINCOLN HIGHWAY ASSOCIATION

Jesse G. Petersen, President
56 Bench Mark Village
Tooele, Utah 84074

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Office of Nuclear Material Safety

October 31, 2000

Dear Mr. Delligatti:

The purpose of this letter is to advise your office that I do concur with the eligibility determinations that were indicated in Enclosure 2 of your letter dated October 16, 2000.

However, I would also like to put it into the record that I submit this concurrence with the utmost reluctance. I do this based not on the merits of the individual sites within the APE, but on the overall impact that the construction of a railroad will have on Skull Valley as a whole.

Jesse G. Petersen

NEW YORK TO SAN FRANCISCO—RAILROAD 3181 MILES; LINCOLN HIGHWAY 3384 MILES; TELEPHONE 3370 MILES

Exhibit B.5-9

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 7, 2000

Mr. John D. Parkyn
Chairman of the Board
Private Fuel Storage, L.L.C.
P.O. Box C4010
La Crosse, WI 54602-4010

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT (TAC NO. L22462)

Dear Mr. Parkyn:

By application dated June 20, 1997, as supplemented, Private Fuel Storage, L.L.C. (PFS) requested a license to receive, transfer, and possess nuclear power reactor spent fuel and other radioactive material associated with spent nuclear fuel (SNF) storage in an independent spent fuel storage facility (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians. PFS proposes to transport the SNF to the Reservation by rail. Currently, the closest rail line is 24 miles north of the Reservation. Therefore, to transport the SNF solely by rail, PFS proposes the construction and operation of a rail line from this existing rail line to the proposed site. The proposed rail line would be located along the western edge of Skull Valley and extend from Skunk Ridge (near Low, Utah) to the ISFSI site on the Reservation. The proposed rail line would be 32 miles long and would traverse only land managed by the U.S. Department of Interior's Bureau of Land Management (BLM).

The U.S. Nuclear Regulatory Commission (NRC), in cooperation with the U.S. Department of Interior's Bureau of Indian Affairs (BIA), BLM, and the Surface Transportation Board (STB), has published a Draft Environmental Impact Statement (DEIS) regarding the PFS proposal. To gain efficiencies, the Federal agencies have also agreed to participate jointly in Section 106 of the National Historic Preservation Act. Section 106 requires the Federal agencies to take into account the effects of PFS project on historic properties.

In May and June of 1999 and in June 2000, a PFS contractor, P-III Associates, performed a Class III cultural resources inventory to identify historic properties in Skull Valley, Utah. For each site within the Area of Potential Effects (APE), the report included eligibility recommendations for inclusion in the National Register of Historic Places. One site, 42TO1187, (rock alignment and cairn) was unevaluated for eligibility.

Enclosed is a request for additional information (RAI) about Site 42TO1187 which is needed by the NRC staff and the cooperating agencies to complete the final review of the cultural resources in Skull Valley. We will expect your reply within 30 days of your receipt of this letter.

Exhibit B.5-10

J. Parkyn 2

Please contact Scott Flanders at (301) 415-1172 if you wish to schedule a public meeting on the RAI or to discuss any questions you may have about this letter or the enclosed RAI. Please reference TAC No. L22462 and Docket No. 72-22 in future correspondence related to this request.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22
TAC No. L22462

Enclosure: Request for Additional Information

cc w/enclosure: EIS Service List

REQUEST FOR ADDITIONAL INFORMATION FOR SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT, DOCKET NO. 72-22

Pursuant to 36 CFR 800.1, Section 106 of the National Historic Preservation Act, Federal agencies are required to take into account the effects of their undertakings on historic properties. The U.S. Nuclear Regulatory Commission (NRC), in cooperation with the U.S. Department of Interior's Bureau of Land Management (BLM) and Bureau of Indian Affairs (BIA), and the Surface Transportation Board (STB) has determined that additional information is needed to evaluate the effect of the Private Fuel Storage Facility on the historic properties within Skull Valley, Utah.

1. Evaluate site 42TO1187 (rock alignment and cairn) to determine its potential eligibility for the National Register of Historic Places. Below is a list of activities the Federal agencies recommend be taken in evaluating the site. The activities should be sequentially conducted in the order they are listed. If any activity leads to a clear determination of the site's origin, function, age and cultural affiliation so that a statement of National Register eligibility can be recommended, the remaining activities do not have to be conducted.

A. Non-intrusive testing

Conduct a metal detector survey to determine the presence or absence of metal artifacts within the defined site boundary.

B. Records Search

1. Conduct a site file search for similar previously recorded archeological feature sites in the region that may have similar characteristics.

2. Conduct a search of homestead records for the Skull Valley vicinity.

3. Conduct a review of the history of sheep herding activities in the area, including, if possible, interviews with persons who may have been engaged in those activities in this area.

C. Tribal Consultation

Use a qualified Cultural Anthropologist to conduct interviews of tribal elders or other knowledgeable members from regional Federally-recognized Indian tribes to determine if this site or similar examples may have cultural value for tribes. The following tribes should be interviewed: Skull Valley Band of Goshute Indians, Confederated Tribes of Goshute Reservation, Tribal Council of the Te-Moak Western Shoshoni Indians of Nevada, Northwestern Band of Shoshone Nation, Northern Ute, and Paiute Indian Tribe of Utah.

D. Subsurface Testing

If completion of either Activities A, B, or C fails to provide sufficient information to determine the site's purpose, origin, and potential eligibility for the National Register of Histroic Places, then subsurface testing will be performed. The scope of the testing effort

2

will be governed by standard stipulations outlined in the permittee's BLM Cultural Resources Use Permit.

P-III Associates did not evaluate site 42TO1187 when it performed a Class III cultural resources inventory to identify historic properties in Skull Valley, Utah.

2. Provide a precise scaled map of site 42TO1187 that clearly delineates the site's boundaries in relationship to the proposed rail centerline and right-of-way boundaries. This map is needed to complete the staff's review.

United States Department of the Interior

NATIONAL PARK SERVICE
CALIFORNIA, MORMON PIONEER, OREGON & PONY EXPRESS NATIONAL HISTORIC TRAILS
Long Distance Trails Office
324 South State Street, Suite 250
Post Office Box 45155
Salt Lake City, Utah 84145-0155

IN REPLY REFER TO:

November 10, 2000

Mark S. Delligatti
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Delligatti:

Thank you for the opportunity to comment on the inventory of archeological and historic sites identified in the project area of the nuclear storage area and the proposed railroad in Skull Valley Utah.

Our review of the sites related to the California National Historic Trail concurs with your recommendation that the sites are determined eligible for the National Register of Historic Places. One concern remains however, and that is the historic landscape. That aspect was not examined in the inventory, nor given recognition in the assessment. The historic landscape of Skull Valley is a significant and critical element of the Hastings Cutoff Route of the California National Historic Trail. The resources of the historic trail are an ensemble of elements that include the landscape. We believe such to be a key element to the National Register determination.

The *Comprehensive Management and Use Plan, Environmental Impact Statement, California National Historic Trail*, (1999) identified, as required, "high potential sites" and "high potential segments" of the trail. One such segment identified in the management plan is that which crosses Skull Valley, and in the nuclear storage project area. It is a section of trail not only historically significant, but meets the criteria of the National Trail System Act (1968, amended 1978) for "high potential segments." The historic landscape is a key item of the criteria.

One notable absence in the documents listed in the bibliography of the report was the trail management plan noted above. It would have provided key information related to the concerns expressed.

Exhibit B.5-11

If you have questions, please contact me at (801) 539-4095.

Sincerely,

Jere L. Krakow

Jere L. Krakow
Superintendent

Cc: Laird Naylor, Salt Lake District Office, Bureau of Land Management
George Ivory, Chairman, Utah Historic Trails Consortium

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 20, 2000

The Honorable Milton J. Hooper, Chairman
Confederated Tribes of the Goshute Reservation
P.O. Box 6104
Ibapah, UT 84034

SUBJECT: SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT CONSULTATION PROCESS FOR THE PROPOSED PRIVATE FUEL STORAGE PROJECT

Dear Chairman Hooper:

On October 23, 2000, the representatives of the U.S. Nuclear Regulatory Commission (NRC), the U.S. Department of Interior's Bureau of Indian Affairs (BIA) and Bureau of Land Management (BLM), and the Surface Transportation Board (STB) met with your representative, Mr. Ken Williams, with regards to the consultation process required under Section 106 of the National Historic Preservation Act as it applies to the Private Fuel Storage, L.L.C. (PFS) project. Pursuant to Title 36 of the U.S. Code of Federal Regulations Part 800 (36 CFR Part 800), the purpose of this consultation process is to provide the Confederated Tribes of the Goshute Reservation the opportunity to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its view on the project's effects on such properties, and participate in the resolution of adverse effects.

The meeting focused on the eligibility recommendations included in the Class III cultural resource inventory report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the area of potential effects (APE). We also solicited information regarding cultural resources that the Confederated Tribes of the Goshute Reservation believe will be affected by the PFS project. Although Mr. Williams indicated he was not aware of any properties of cultural and traditional significance within the APE, he stated that he would discuss the project, the report, and the potential mitigation measures with the tribal Elders.

On November 14, 2000, Ms. Melanie Wong of NRC contacted Mr. Williams to discuss the tribal elders' review of the project. This is a follow-up letter confirming the information provided in the telephone conversation. Mr. Williams informed Ms. Wong that based on discussions with the tribal Elders (Mabel Salazar and Orlena McCurby), there were no properties of cultural and traditional significance to the Confederated Tribes of the Goshute Reservation within the APE. If your understanding of the telecon between Ms. Wong and Mr. Williams differs from the above, please notify us as soon as possible.

Exhibit B.5-12

M. Hooper -2- November 20, 2000

If you have any further questions or comments regarding this request, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson Ball (STB) at (202) 565-1539.

Thank you for your assistance in helping us identify cultural resources within the APE.

Sincerely,

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

cc: EIS Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001
December 1, 2000

The Honorable Leon D. Bear, Chairman
Skull Valley Band of Goshute Indians
2480 South Main, No. 110
Salt Lake City, UT 84115

SUBJECT: REQUEST FOR CONCURRENCE ON DETERMINATION OF ADVERSE EFFECTS FOR THE ARCHEOLOGICAL AND HISTORIC SITES IDENTIFIED WITHIN THE AREA OF POTENTIAL EFFECTS AND DRAFT MEMORANDUM OF AGREEMENT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Chairman Bear:

As you are aware, Private Fuel Storage, Limited Liability Company (PFS) proposes to construct and operate an independent spent fuel storage installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians. The U.S. Nuclear Regulatory Commission (NRC), in cooperation with the U.S. Department of Interior's Bureau of Indian Affairs (BIA) and Bureau of Land Management (BLM), and the Surface Transportation Board (STB) have offered Federally recognized Indian tribes and other organizations that may be concerned with the possible effects of the project on historic properties an opportunity to participate in the consultation process required by Section 106 of the National Historic Preservation Act.

In May and June of 1999 and in June 2000, a PFS contractor, P-III Associates, performed a Class III cultural resources inventory in Skull Valley, Utah. All portions of the Area of Potential Effect (APE) were included in the study area. PFS provided consulting parties with a copy of the report documenting the cultural resources located within the APE. For all sites within the APE, the report includes a recommendation with regard to each site's eligibility for inclusion in the National Register of Historic Places.

The cooperating Federal agencies reviewed the cultural resources inventory report and concur with the eligibility determinations. Furthermore, we requested the consulting parties' concurrence on these eligibility determinations. Also, during the week of October 23-27, 2000, the cooperating Federal agencies met with representatives of the consulting parties to discuss the eligibility recommendations included in the report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the APE. Based on these meetings, a consensus determination of eligibility on historic properties has been reached. Enclosure 1 is a list of the eligible sites, sites that are not eligible, and the criteria for determining if a site qualifies for inclusion in the National Register of Historic Places.

Pursuant to 36 CFR 800.5, an adverse effect is found when a project may alter, directly or indirectly, any of the characteristics of a historic property that qualifies the property for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association. Based on these criteria, the cooperating Federal agencies have determined that the proposed project will have adverse effects on properties that are eligible for inclusion in the National Register of Historic Places.

Exhibit B.6-13

Chairman Bear -2- December 1, 2000

As a consequence of the finding of adverse effect, a draft Memorandum of Agreement (Agreement) has been developed that outlines agreed-upon measures that PFS will take to avoid, minimize, or mitigate these adverse effects (Enclosure 2). The cooperating Federal agencies request your concurrence on the determination of adverse effects and comments regarding the draft Agreement within 30 days.

If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson-Ball (STB) at (202) 565-1530.

Sincerely,

Scott Flanders for

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: 1. List of Eligible and Non-Eligible Sites
2. Draft Memorandum of Agreement

cc: PFS Service Lists
Natalie Gochnour, State Planning Coordinator

CULTURAL RESOURCES INVENTORY

I. Sites eligible for inclusion in the National Register of Historic Places.

Site Number	Site Name	Criteria	Effect
42TO709	Emigrant Trail/Hastings Cutoff	A, B	Adverse
42TO1409	U.S. Route 40	A	Adverse
42TO1410	"New" Victory Highway	A, B, C	Adverse
42TO1411	"Old" Victory Highway	A	Adverse
42TO1412	Western Union telegraph line	A	Adverse
42TO1413	Western Pacific Railroad	A, C	Adverse
42TO1416	Road to Deep Creek	A, B	Adverse
42TO1417	Road to Sulphur Spring or Eight-Mile Spring	A	Adverse

II. Sites not eligible for inclusion in the National Register of Historic Places.

Site Number	Site Name
42TO1414	Historic habitation/gas station
42TO1415	Gas Station
42TO1343	Buried AT&T telephone line

III. Sites not evaluated for inclusion in the National Register of Historic Places.

Site Number	Site Name
42TO1187	Rock alignment and cairns

Enclosure 1

JOHN PAUL KENNEDY, P.C.
ATTORNEY AT LAW
1385 YALE AVENUE
SALT LAKE CITY, UTAH 84105
TELEPHONE (801) 583-6170
TELEFAX (801) 581-1007

December 8, 2000

Mark S. Delligatti
Spent Fuel Licensing Section
Spent Fuel Project Office
Office of NMSS
Nuclear Regulator Commission
Washington, D.C. 20555-0001

Re: Request for Concurrence

Dear Mr. Delligatti:

I represent the Confederated Tribes of the Goshute Reservation. They do not consent to your request for concurrence on determination of adverse effects or the draft memo of agreement.

The Goshute Tribe at Ibapah believes that the spent fuel waste storage project will so change the character of the area in appearance, perception, and use that it cannot exist without doing irreparable damage to the area. For these reasons and all of the others previously cited to the NRC, the BIA, and others, the Goshute Tribe continues to object to the proposed project as a desecration to its aboriginal area and the important sites located there.

Yours very truly,

John Paul Kennedy

Exhibit B.5-14

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 12, 2000

Mr. John D. Parkyn
Chairman of the Board
Private Fuel Storage, L.L.C.
P.O. Box C4010
La Crosse, WI 54602-4010

SUBJECT: PROPOSED MITIGATION MEASURES DEVELOPED DURING THE CONSULTATION PROCESS REQUIRED FOR SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT (TAC NO. L22462)

Dear Mr. Parkyn:

By application dated June 20, 1997, as supplemented, Private Fuel Storage L.L.C. (PFS) requested a license to receive, transfer, and possess nuclear power reactor spent fuel and other radioactive material associated with spent nuclear fuel (SNF) storage in an independent spent fuel storage installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians. PFS proposes to transport the SNF to the Reservation by rail. Currently, the closest rail line is 24 miles north of the Reservation. Therefore, to transport the SNF solely by rail, PFS proposes the construction and operation of a rail line from the existing rail line to the proposed site. The proposed rail line would be located along the western edge of Skull Valley and extend from Skunk Ridge (near Low, Utah) to the ISFSI site on the Reservation. The proposed rail line would be 32 miles long and would traverse only land managed by the U.S. Department of Interior's Bureau of Land Management (BLM).

The U.S. Nuclear Regulatory Commission (NRC), in cooperation with the U.S. Department of Interior's Bureau of Indian Affairs (BIA) and BLM and the Surface Transportation Board (STB), has published a Draft Environmental Impact Statement (DEIS) regarding the PFS proposal. To gain efficiencies, the Federal agencies have also agreed to participate jointly in Section 106 of the National Historic Preservation Act. Section 106 requires the cooperating Federal agencies to take into account the effects of the PFS project on historic properties.

In May and June of 1999 and in June 2000, a PFS contractor, P-III Associates, performed a Class III cultural resources inventory to identify historic properties in Skull Valley, Utah. In the cultural resources report, P-III noted that a Treatment Plan was prepared to mitigate the adverse effects on the Hasting Cutoff (page 33). For each site within the area of potential effect (APE), the report included eligibility recommendations for inclusion in the National Register of Historic Places and treatment recommendations for all affected sites.

During the week of October 23-27, 2000, the cooperating Federal agencies met with representatives of the consulting parties to discuss the eligibility recommendations included in

Exhibit B.5-15

J. Parkyn -2-

the report and potential mitigation measures for anticipated adverse impacts to the cultural resources within the APE. Based on these meetings, the cooperating Federal agencies and the consulting parties developed the enclosed list of mitigation measures which outlines agreed-upon measures that PFS would take to avoid, minimize, or mitigate these adverse effects. These mitigation measures should be incorporated into a revised Treatment Plan. In addition, all requirements of the Memorandum of Agreement should be incorporated into the Treatment Plan including a Discovery Plan. By letter dated November 7, 2000, additional analysis was requested for Site 42TO1187. Pending the outcome of this analysis, additional measures may also need to be added to the Treatment Plan. To maintain the schedule of the cooperating Federal agencies, the staff must receive a draft Treatment Plan by January 2, 2001.

Please contact Scott Flanders at (301) 415-1172 if you wish to discuss any questions you may have about this letter. Please reference TAC No. L22462 and Docket No. 72-22 in correspondence related to this request.

Sincerely,

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22
TAC No.: L22462

Enclosure: Proposed Mitigation Measures

cc w/enclosure: EIS Service List

MITIGATION MEASURES DEVELOPED DURING THE CONSULTATION PROCESS REQUIRED FOR SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION AC, DOCKET NO. 72-22

I. Sites eligible for inclusion in the National Register of Historic Places.

For All Eligible Sites

- Acquire a sequence of aerial photos through time beginning with the earliest available from the National Archives, as well as other archives if available.
- Interpret changes through time as shown on the photos (chronology, integrity of location, etc.).
- Acquire an aerial infrared photo, if available.
- Make copies of each photo for each site; file these with the site form.
- Map portion of site in and near the APE using GPS, including all features present in the area that would be destroyed; describe all such features in detail.
- Conduct a metal detector survey of APE; collect, analyze, and curate artifacts in-state.
- Use Chairperson of the Utah Historic Trails Consortium as a contact for important information to be used in implementing treatment, including past research and historical documents, which should be briefly summarized.
- Update site form. Updates should include information based on photo interpretation, copies of relevant aerial photos, GPS data, map data, descriptive data, analysis and curation data for collected artifacts, and brief summary of historical data, with a reevaluation of the applicability of each of the eligibility criteria.
- Prepare a formal report on the results of mitigation.
- Establish in the Treatment Plan which portions of compiled documentation is appropriate to release to various entities. Archive duplicates of this data with the appropriate entities.
- Provide Treatment Plan to Chairperson of the Utah Historic Trails Consortium before mitigation measures begin.
- Avoid as much of the site as possible during construction by barricading.
- Assist the Skull Valley Band of Goshutes in developing educational materials (e.g., brochures/booklet/exhibition) on the Skull Valley to be located at appropriate locations (e.g., proposed Skull Valley Band Cultural Center). Assistance could take the form of monetary funding or providing facilities for a cultural exhibit.

Additional Measures at Each Site

42TO709, Emigrant Trail/Hastings Cutoff and
42TO1417, Road to Sulphur Spring or Eight-Mile Spring

- Archeological survey along length of Trail on all public lands from Hope Wells to Redlum Spring; record and map Trail, artifacts, features, other sites, and photo points using GPS, conduct black and white photo documentation of entire segment.

- Provide appropriate funding for developing, printing and distributing the first 5,000 copies of a brochure describing the California Trail from Salt Lake to Humbolt River to the National Park Service Long Distance Trails Office (NPS). This brochure must meet the NPS standards for inclusion in their series on the California Trail. It is to be distributed by the NPS.

- Provide appropriate funding for printing of an additional 50,000 copies of the existing NPS brochure on the entire California Trail to the NPS for distribution by the NPS.

- Establish a Kiosk for the purpose of interpreting data about the trail at an appropriate location.

42TO1409, U.S. Route 40

- Measures indicated above for all eligible sites should constitute adequate mitigation. Certain portions of the site should be avoided by heavy vehicles and can be avoided if an alternate access route is used.

- Pad the road surface to ensure protection from the impacts of heavy vehicle traffic, used in concert with avoidance of most of the road surface.

- Monitoring of construction access area should be conducted quarterly during rail construction, and reports on the effectiveness of protection measures should be provided to BLM to require additional protection measures if warranted.

42TO1410, "New" Victory Highway

- Measures indicated above for all eligible sites should constitute adequate mitigation.

- Portion of site that cannot be avoided is in very poor condition; avoid segments that can be avoided and that have better integrity.

42TO1411, "Old" Victory Highway

- Measures indicated above for all eligible sites should constitute adequate mitigation.

- Aerial photos are very important at this site to ascertain the correct location for this early highway.

42TO1412, Western Union Telegraph Line

- Measures indicated above for all eligible sites should constitute adequate mitigation.

42TO1413, Western Pacific Railroad (Union Pacific Railroad)

- Measures indicated above for all eligible sites should constitute adequate mitigation.

42TO1416, Road to Deep Creek

- Measures indicated above for all eligible sites should constitute adequate mitigation.
- Aerial photos are very important at this site to ascertain the correct location for this badly damaged wagon trail.

II. Sites not eligible for inclusion in the National Register of Historic Places.

42TO1343, Buried AT&T Telephone Line

42TO1414, Historic Habitation/Gas Station

42TO1415, Gas Station

III. Site to be evaluated for inclusion in the National Register of Historic Places.

42TO1187, **Rock Alignment and Cairns**

A CONTINUOUS CONNECTING IMPROVED HIGHWAY FROM THE ATLANTIC TO THE PACIFIC"

THE LINCOLN HIGHWAY ASSOCIATION

Jesse G. Petersen, President
56 Bench Mark Village
Tooele, UT 84074
435-882-6581

December 14, 2000

Mark S. Delligatti
Spent Fuel Licensing Section
Nuclear Regulatory Commission
Washington, DC, 20555-0001

Subject: Private Fuel Storage Project

Dear Mr. Delligatti:

This is in response to your letter of December 1, 2000 which was a request for concurrence on the latest Cultural Resources Inventory and the Draft Memorandum of Agreement.

I concur.

I would also like to note that I am most anxious to see the proposed treatment plan. I am assuming that I will get a copy when it is completed.

Incidently, I would appreciate it if you would make a correction in my mailing address. It is 56 Bench Mark Village rather than 55.

Thank you, and best regards,

NEW YORK TO SAN FRANCISCO—RAILROAD 3181 MILES; LINCOLN HIGHWAY 3384 MILES; TELEPHONE 3370 MILES

Exhibit B.5-16

United States Department of the Interior

NATIONAL PARK SERVICE
CALIFORNIA, MORMON PIONEER, OREGON & PONY EXPRESS NATIONAL HISTORIC TRAILS
Long Distance Trails Office
324 South State Street, Suite 250
Post Office Box 45155
Salt Lake City, Utah 84145-0155

IN REPLY REFER TO:

December 18, 2000

Mark S. Delligatti
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Delligatti:

We appreciate the opportunity to respond to your letter of December 1st regarding the Private Fuel Storage installation in Skull Valley and on the Goshute Reservation. Our response is on the adverse effects and the draft Memorandum of Agreement.

The determination of adverse effects on the cultural resources identified in the inventory of the project area is noted and we concur with that determination. In our November 10, 2000, response, we raised a concern about the lack of the cultural (historic) landscape and once again wish to call that to your attention. The same adverse effect noted for the archeological resources pertains to the cultural landscape.

Skull Valley holds a significant and critical landscape of the California National Historic Trail. It is part and parcel of the cultural resources and worthy of inclusion as a key element in not only the determination of eligibility, but also one that will be compromised and adversely effected by the Private Fuel Storage installation. It is a resource just as those listed sites with which we concur.

Again, the *Comprehensive Management and Use Plan, Environmental Impact Statement, California National Historic Trail*, (1999) identified, as required, "high potential sites" and "high potential segments" of the trail. One such segment identified in the management plan is that which crosses Skull Valley, and thus is in the project area. It is a section of trail not only historically significant, but meets the criteria of the National Trail System Act (1968), for "high potential segments." The cultural landscape is a key item of the criteria.

The draft Memorandum of Agreement seems appropriate in all respects except the cultural landscape. In the Stipulations section, **I. Development of Treatment Plan (for**

Exhibit B.5-17

Eligible Resources), it does not contain any language about the landscape. Several of the individual items pertain to cultural landscape just as they do to archeological resources including data recovery, field analysis, dissemination of the data, schedule of reports, and treatment of the landscape.

As developed above, and in our November 10th letter, the cultural landscape merits inclusion. It is as much a part of the cultural resources of Skull Valley as the archeological resources. We urge you to note them.

Please contact us if we can clarify our comments.

Sincerely,

Jere L. Krakow

Jere L. Krakow
Superintendent

cc: Laird Naylor, Salt Lake District Office, Bureau of Land Management
George Ivory, Chairman, Utah Historic Trails Consortium
Utah State Historic Preservation Officer

Skull Valley Band of Goshute Indians
Skull Valley Reservation
P.O. Box 150
Grantsville, Utah 84029
Office: (801) 474-0535
Fax: (801) 474-0534

Mark Delligatti
Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

December 22, 2000

RE: Request for Concurrence on determination of adverse effects for the archeological and historic sites identified within the area of potential effects.

Mr. Delligatti:

With reference to your letter of December 1, 2000, we do concur with the determination of the cooperating Federal agencies with regard to their determination of adverse affects of certain historic and archeological sites.

After a careful review of the Draft Memorandum of Agreement, we have found one discrepancy. One page two of the agreement, second paragraph, please be advised that the Skull Valley Band of Goshute Indians was not organized under Section 16 of the Indian Reorganization Act of 1934. We were organized under the Treaty, Shoshoni-Goships of October 12, 1863, and ratified by executive orders in 1917 and 1918.

If you have any questions or need addition information, feel free to contact me at your convenience.

Thank you,

Leon D. Bear, Chairman

LDB/bbs

Exhibit B.5-18

Utah Historic Trails Consortium

300 Rio Grande Salt Lake City, Utah 84101 Ph.(801) 533-.3500

December 27, 2000

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
And Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Delligatti:

In response to your letter of December 1, 2000, and Draft Memorandum of Agreement which outlines agreed-upon measures to avoid, minimize, or mitigate adverse effects to certain historic sites in Skull Valley by the proposed spent fuel storage installation on the Skull Valley Goshute Reservation I have requested a review of your Draft Memorandum by various Member Organizations of our Utah Historic Trails Consortium but have not been able to secure a complete consensus of opinion from them at this time. Our Consortium does not hold a regular meeting in the month of December and it will not be possible to have a complete discussion of this subject until our next meeting, which is scheduled January 25, 2001.

I apologize for not being able to meet your requested 30 day response but cannot act on this matter without discussion, reaction, and concurrence from the members of our Consortium who have direct interest and involvement in the historic trails and sites in Skull Valley. You indicate in your Draft Memorandum of Agreement that failure to comment within 30 days will be presumed to represent concurrence with the Treatment Plan. If you are unable to grant us additional time to meet and discuss your plan then, as Chairman of the Utah Historic Trails Consortium, I can only indicate our rejection of the plan.

Unless I hear differently from your office, I will proceed to present this to our members at our next meeting on January 25th.

Sincerely,

George Ivory

George Ivory, Chairman
Utah Historic Trails Consortium

Exhibit B.5-19

Stone & Webster A Shaw Group Company
Founded 1889

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington. D.C. 20555-0001

January 25. 2001

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
DOCKET NO. 72-22 / TAC NO. L22462
PRIVATE FUEL STORAGE FACILITY
PRIVATE FUEL STORAGE L.L.C.

Reference: NRC Letter. Delligatti to Parkyn. Request for Additional Information for Section 106 of the National Historic Preservation Act. dated November 7. 2000

In the above referenced letter the NRC requested additional information concerning site 42T01187 (rock alignment and cairn) which was identified in the Private Fuel Storage (PFS) Class III Cultural Resource Inventory. Revision 1 dated September 2000. This additional information is needed by the NRC to complete the final review of the cultural resources in Skull Valley.

An evaluation of the site has been performed for PFS by P-III Associates. Inc. The results of this evaluation are presented in the Attachment 1 letter report. Alan Schroedl to John Donnell. dated January 24. 2001. Attachment 2 provides a map that shows the distances from the center of the rock alignment to the proposed rail centerline (550'). proposed right-of-way boundary (450'). and proposed temporary construction easement (400'). Additional information on the site itself (site map. site photographs. etc.) can be found in the aforementioned Class III Cultural Resource Inventory.

After completion of the activities suggested in the RAI. item #1 A. B.1. and B.3. PFS has been able to conclude that site 42T01187 is not eligible for listing on the National Register of Historic Places. If you have any questions regarding this response. please contact me at 303-741-7009.

Sincerely,

John L. Donnell
Project Director
Private Fuel Storage L.L.C.

Enclosure

Stone & Webster. Inc.
7677 East Berry Avenue
Englewood, Colorado 80111-2137
Phone: 303.741.7700
Fax: 303.741.7670 or 303.741.7671

Exhibit B.5-20

NRC 2 January 25, 2001

Copy to (with enclosure):

Mark Delligatti
Scott [redacted]
John Parkyn
Jay Silberg
Sherwin Turk
Greg Zimmerman
Scott Northard
Denise Chancellor
Richard E. Condit
John Paul Kennedy
Joro Walker
Lisa Kirschner

Utah Historic Trails Consortium

300 Rio Grande Salt Lake City, Utah 84101 Ph.(801) 533-.3500

Mormon Trails Association
National Society,
Daughters of Utah Pioneers
National Society,
Sons of Utah Pioneers
National Pony Express Assoc.,
Utah Division
Oregon/California Trails Assoc.,
Utah Crossroads
The Church of Jesus Christ
of Latter-day Saints
Utah Department of Community
and Economic Development
Utah Department of Natural
Resources
Utah Department of Transportation
Utah Travel Council
Utah Division of Parks
and Recreation
Utah Division of State History
Utah Division of Lands
and Forestry
Utah Division of Indian Affairs
Utah Statehood Centennial
Commission
U.S. Department of Agriculture,
Forest Service,
Intermountain Region
U.S. Department of the Interior,
National Park Service,
Rocky Mountain Region
U.S. Department of the Interior,
Bureau of Land Management, UT
U.S. Mormon Battalion, Inc.
U.S. Mormon Battalion
Auxiliary

January 31, 2001

Mark S. Delligatti, Senior Project Manager
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
And Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Delligatti:

As I advised you in my letter of December 27, 2000, our Utah Historic Trails Consortium met on January 25, 2001 and discussed your Draft Memorandum of Agreement on the proposed Private Fuel Storage Facility in Skull Valley, Utah. Our members reviewed the Draft Copy and voted to authorize me to sign for our Consortium said Agreement as a Consulting Party. We wish to stipulate, however, that our signing this document is approval only of the Cultural Resources Inventory Study and associated mitigation proposals and in no way should be construed as approval of the Private Fuel Storage Project itself.

We also wish to raise some additional questions concerning the proposed Rail Line which will run down the West side of Skull Valley. At present the view across the valley is little changed from the time wagons made their way along the Hastings Cutoff Trail and building a Rail Line will certainly damage the pristine value of that view. Our other concern relates to the actual route of the line in the vicinity of the pristine trail and we ask that members of our Consortium be involved on-site when a survey is completed which will determine the actual location of the Railroad where it crosses Hastings Cutoff. We would appreciate your including these two concerns in any future drafts of your Memorandum of Agreement.

Sincerely,

George Ivory

George Ivory, Chairman
Utah Historic Trails Consortium

Exhibit B.5-21

-9-

UTAH STATE HISTORIC PRESERVATION OFFICER

By:__________________________________
Date:_______________

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By:__________________________________
Date:_______________

<u>INVITED CONSULTING PARTIES:</u>

CONFEDERATED TRIBES OF THE GOSHUTE RESERVATION

By:__________________________________
Date:_______________

TRIBAL COUNCIL OF THE TE-MOAK WESTERN SHOSHONE INDIANS OF NEVADA

By:__________________________________
Date:_______________

PAIUTE INDIAN TRIBE OF UTAH

By:__________________________________
Date:_______________

UTAH HISTORIC TRAILS CONSORTIUM

By: George Ivory
Date: January 31, 2001

OHNGO GAUDADEH DEVIA

By:__________________________________
Date:_______________

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 8, 2001

Mr. Jere Krakow, Superintendent
National Park Service
Long Distance Trails Office
324 South State Street, Suite 250
P.O. Box 45155
Salt Lake City, UT 84145-0155

SUBJECT: EXTENSION OF TIME TO REVIEW THE DETERMINATION OF ADVERSE EFFECTS FOR THE ARCHEOLOGICAL AND HISTORIC SITES IDENTIFIED WITHIN THE AREA OF POTENTIAL EFFECTS AND DRAFT MEMORANDUM OF AGREEMENT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Krakow:

By letter dated December 1, 2000, the U.S. Nuclear Regulatory Commission (NRC), in cooperation with the U.S. Department of Interior's Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), and the Surface Transportation Board (STB), requested your concurrence on the determination of adverse effects on properties that are eligible for inclusion in the National Register of Historic Places. As a consequence of the finding of adverse effect, a draft Memorandum of Agreement (Agreement) was developed that outlines agreed-upon measures that Private Fuel Storage, L.L.C. will take to avoid, minimize, or mitigate these adverse effects. The cooperating Federal agencies requested your concurrence on the determination of adverse effects and comments regarding the draft Agreement within 30 days.

The Confederated Tribes of Goshute Reservation, the Utah Chapter of the Lincoln Highway Association, and the Skull Valley Band of Goshute Indians have responded to the request. The member organizations of the Utah Historic Trails Consortium and the Advisory Council on Historic Preservation requested additional time to review the document. No response was received from the other consulting parties. Based on these requests, the cooperating Federal agencies have revised the response date to February 28, 2001.

If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson-Ball (STB) at (202) 565-1530.

Sincerely,
/RA/ original signed by /s/
Mark S. Delligatti, Senior Project Manager
Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22
cc: PFS Service Lists
Natalie Gochnour, Utah State Planning Coordinator

Exhibit B.5-22

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 12136 West Bayaud Avenue, #330
Lakewood, Colorado 80226

February 15, 2001

Mark S. Delligatti
Senior Project Manager
Spent Fuel Licensing Section
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington D.C. 20555-0001

RE: *Draft Memorandum of Agreement (MOA) for the Private Fuel Storage, Limited Liability Company (PFS) Proposed Spent Fuel Storage Installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians.*

Dear Mr. Delligatti:

On December 5, 2000, we received your letter transmitting the draft Memorandum of Agreement (MOA) for the above referenced undertaking. We have reviewed this draft, and follow up documentation that was provided us by Melanie Wong of your staff. We offer the following comments for your consideration in finalizing the MOA:

1. The agreement must designate a single lead federal agency, which will be ultimately responsible for ensuring that the terms of the agreement are carried out. As the Nuclear Regulatory Commission appears to be coordinating Section 106 review for the four participating Federal agencies, we recommend that NRC be designated as lead, for purposes of Section 106. A WHEREAS clause should briefly explain that the cooperating Federal agencies have agreed that NRC shall serve as the lead federal agency for purposes of compliance with Section 106 of the National Historic Preservation Act. Also, other sections of the MOA should be revised to replace the phrase "*the cooperating Federal agencies*" with the NRC. If the parties desire, tasks described in the stipulations section of the agreement may be assigned to another signatory agency (such as the Bureau of Land Management) where appropriate.

2. The 2nd WHEREAS clause references figures in the cultural resources inventory report in defining the area of potential effects (APE). The referenced figures are at a very small scale, and therefore should be supplemented with a verbal description (e.g., right-of-way width along the low transportation corridor, legal descriptions and dimensions of other areas investigated), perhaps in an attachment to the agreement. Also, the APE definition should accurately reflect any modifications made since completion of the inventory report.

Exhibit B.5-23

3. Please revise the 2nd WHEREAS clause on page 2 to read: *"WHEREAS, the proposed private fuel storage facility is located on reservation lands of the Skull Valley Band of the Goshute Indians (Skull Valley Band), and NRC has consulted with the Skull Valley Band, a federally recognized Indian tribe, organized under Section 16 of the Indian Reorganization Act of 1934, which...."*

4. Fourth WHEREAS on page 2: A better reference for consultation with tribes is 36 CFR 800.3(f)(2).

5. Fifth WHEREAS clause on page 2: the correct reference for consultation with applicants is 36 CFR 800.2(c)(4).

6. The 7th and 8th WHEREAS clauses on page 2, regarding the class III inventory and consultation regarding adverse effects are unnecessary. We recommend deleting them.

7. The opening statement after the title "Stipulations" should state: *"The NRC shall ensure that the following measures are carried out."*

8. Stipulation I, and the rest of the agreement, should use terms that are defined in the regulations wherever possible. In the title of Stipulation I, use "Historic Properties" instead of "eligible resources." We also recommend that Stipulation I.a. open with the following statement, to clarify who is responsible for developing the plan: *"[identify either NRC or PFS] shall develop a treatment plan for the treatment of effects of the undertaking on the historic properties identified in Enclosure 1 of this agreement."*

9. Also, in Stipulation I.a, the first sentence should be revised to read: *"The Treatment Plan will identify (1) all National Register eligible properties in the APE, (2) the nature of the effects..,"* and the reference to the Council's publication, "Treatment of Archaeological Properties" should be changed to our more current guidance on archaeological data recovery: *"The Council's Recommended Approach for Consultation on Recovery of Significant Information From Archaeological Sites (Federal Register Vol. 64, No. 95, May 18, 1999)."* We also recommend that this stipulation state that NRC (or PFS) shall use as a basis for the Treatment Plan the proposed mitigation measures from the letter dated December 12, 2000, from NRC to Private Fuel Storage. Rather than referencing the letter in the MOA, it would be best to include the three page outline of mitigation measures as an enclosure to the MOA.

9. As we understand it, archaeological data recovery is not currently proposed as mitigation for any historic properties in the APE. Stipulation I.B. may therefore not be necessary. However, if you wish to retain this in case archaeological data recovery should become necessary, the opening sentence of Stipulation I.B., should be revised to read: *"Where archaeological data recovery is recommended for the treatment of historic properties, the Treatment Plan shall specify..."*

10. Stipulation I.d.: We recommend the following rewording: *"If any signatory or concurring party requests revisions to the Treatment Plan, NRC shall attempt to address the request and*

provide the parties to this Agreement 20 days from receipt to review and comment on the proposed revisions. Any timely objections to the Treatment Plan or the revised Treatment Plan shall be resolved in accordance with Stipulation VII."

11. Stipulation I.e: please reword this stipulation to identify who is responsible for preparing the report and submitting it to the other parties for review.

12. The measures for addressing discoveries, Stipulation IV, should be consistent with the Cultural Resource Conditions contained in the Draft EIS (page 9-11 to 9-12). The proposed consultation with "the cooperating Federal agencies" in this draft MOA might prove too cumbersome for the short turn around needed to address discoveries that occur during project construction. The more specific consultation with BLM or BIA, which is included in the draft EIS appears more manageable.

13. Stipulation VII, Dispute Resolution: please strike the word *"signatory"* from the first sentence. Concurring parties should have the same right to invoke the dispute resolution clause as the signatory parties.

14. VIII, Effective Date: This stipulation is somewhat unclear regarding when the agreement goes into effect. It should state that the agreement shall become effective when executed by the NRC, BIA, BLM, STB, Skull Valley Band of the Goshute Indians, and the Council.

15. Stipulation X, Termination: please delete the sentence reading *"This agreement will remain in effect until construction of the rail line and PFS facility ceases."* The agreement should remain in effect until all of the its provisions have been carried out. Rather than stating that the agreement will terminate upon completion of construction, we recommend including a date, after which the signatories will consult to determine whether the agreement should be amended, terminated, or remain in force, as described in the closing sentence.

16. Headings for the signature pages should read: "Signatory Parties," and "Concurring Parties."

Thank you for providing us an opportunity to review the draft MOA for this undertaking. If you have any questions or concerns regarding these recommendations, please contact Carol Gleichman of our staff at (303) 969-5110.

Sincerely,

Don L. Klima
Director
Office of Planning and Review

Private Fuel Storage, L.L.C.

7677 East Berry Ave., Englewood, CO 80111-2137
Phone 303-741-7009 Fax: 303-741-7806
John L. Donnell, P.E., Project Director

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

February 28, 2001

DRAFT MEMORANDUM OF AGREEMENT REGARDING PROTECTION OF CULTURAL RESOURCES DURING PFSF CONSTRUCTION AND OPERATION
DOCKET NO. 72-22 / TAC NO. L22462
PRIVATE FUEL STORAGE FACILITY
PRIVATE FUEL STORAGE L.L.C.

Reference: U.S. NRC Letter, Delligatti to Parkyn, "Request for Concurrence on Determination of Adverse Effects for the Archeological and Historic Sites Identified Within the Area of Potential Effects and Draft Memorandum of Agreement for the Proposed Private Fuel Storage Facility", dated December 1, 2000

Private Fuel Storage (PFS) has completed a detailed review of the draft Memorandum of Agreement that was transmitted with the referenced letter. The purpose of this letter is to submit a revised draft Memorandum of Agreement that includes PFS comments (attached). Please note that PFS has preserved the integrity of the agencies' draft as closely as possible. The draft changes are generally intended to (1) clarify the facts outlined in the WHEREAS clauses (based on PFS's understanding of the facts to date); (2) establish consistency between the Treatment Plan provisions and the agreed upon mitigation measures; (3) clarify the specific time periods associated with dispute resolution; and (4) identify the status of the signatory and concurring parties consistent with the pertinent laws and implementing regulations. For clarity, PFS has not attempted to identify ("redline") all its revisions in the attachment but can provide a redline upon agency request.

PFS appreciates consideration of our comments and would like to review any supplemental comments received by any party or entity. After agency review, PFS would welcome an opportunity for follow-up in a conference call to discuss specific issues.

Exhibit B.5-24

If you have any questions regarding this response, please contact me at 303-741-7009.

Sincerely,

John L. Donnell
Project Director
Private Fuel Storage L.L.C.

Attachment

Copy to (with enclosure):
- Mark Delligatti
- Scott Flanders
- John Parkyn
- Jay Silberg
- Sherwin Turk
- Greg Zimmerman
- Scott Northard
- Denise Chancellor
- Richard E. Condit
- John Paul Kennedy
- Joro Walker

COPY
STONE & WEBSTER ENGINEERING CORPORATION

JLDonnell-1/1
JLCooper-1/1
JRJohns-1/1
DWLewis-1/0
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DRAFT
MEMORANDUM OF AGREEMENT
among the
U.S. NUCLEAR REGULATORY COMMISSION,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS,
WESTERN REGIONAL OFFICE,
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT,
SALT LAKE FIELD OFFICE,
U.S. SURFACE TRANSPORTATION BOARD,
SKULL VALLEY BAND OF GOSHUTE INDIANS,
ADVISORY COUNCIL ON HISTORIC PRESERVATION
and
PRIVATE FUEL STORAGE, L.L.C.
regarding the
CONSTRUCTION AND OPERATION OF AN INDEPENDENT SPENT FUEL STORAGE INSTALLATION ON THE RESERVATION OF THE SKULL VALLEY BAND OF GOSHUTE INDIANS AND THE RELATED TRANSPORTATION FACILITY IN TOOELE COUNTY, UTAH

WHEREAS, the cooperating Federal agencies, the U.S. Nuclear Regulatory Commission (NRC), U.S. Department of the Interior, Bureau of Indian Affairs (BIA), Western Regional Office, U.S. Department of the Interior, Bureau of Land Management (BLM), Salt Lake Field Office, and U.S. Surface Transportation Board (STB) propose to approve the Private Fuel Storage L.L.C. (PFS) Project (hereafter the Project), described as the preferred alternative on page 9-xx of the Final Environmental Impact Statement, dated XXXX 2001, on the Reservation of the Skull Valley Band of Goshute Indians in Tooele County, Utah; and

WHEREAS, the cooperating Federal agencies in consultation with the Utah State Historic Preservation Officer (SHPO) have established the Project's Area of Potential Effects (APE), as defined at 36 CFR 800.16(d), as shown in Figures 1-2 of the Class III Cultural Resource Inventory of the Private Fuel Storage Project Area in Skull Valley, Tooele County, Utah, (hereafter the Report); and

WHEREAS, the cooperating Federal agencies have consulted with the SHPO on (1) determinations regarding eligible properties and (2) potential adverse effects on historic properties within the APE; eight of these properties have been determined to be eligible for inclusion on the National Register of Historic Places through application of the criteria at 36 CFR 60.4; a list of these properties and their eligibility and effect determinations are presented in Enclosure 1; and,

WHEREAS, the cooperating Federal agencies have consulted with the Advisory Council on Historic Preservation (hereafter the Council) pursuant to Section 800.2 of the regulations (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act (the Act) on the determination regarding the adverse effect of the Project on properties eligible for inclusion on the National Register of Historic Places and to resolve any potential adverse effects of the Project on historic properties; and

390598.1

WHEREAS, the cooperating Federal agencies have contacted the SHPO and invited the SHPO to consult on this Memorandum of Agreement (Agreement); and

WHEREAS, the SHPO has not provided substantive response on the Agreement such that the cooperating Federal agencies determined that further consultation would not be productive and accordingly requested that the Council comment on the Agreement; and

WHEREAS, the cooperating Federal agencies have consulted with the Skull Valley Band of Goshute Indians (Skull Valley Band), a Federally recognized Indian Tribe, pursuant to the Treaty, Shoshoni-Goships of October 12, 1863, ratified by Executive Orders in 1917 and 1918, which exercises general governmental jurisdiction over all lands of the Reservation of the Skull Valley Band, and for purposes of this consultation is an Indian tribe as described at 36 CFR 800.3(d), regarding this Agreement; and

WHEREAS, no provision of this Agreement will be construed by any of the signatory or concurring parties as abridging or debilitating any sovereign powers of the Skull Valley Band; affecting the trustee-trustor relationship between the Secretary of the Interior and the Skull Valley Band; or interfering with the government-to-government relationship between the United States and the Skull Valley Band; and

WHEREAS pursuant to 36 CFR 800.2, the cooperating Federal agencies have consulted with The Confederated Tribes of the Goshute Reservation, The Tribal Council of the Te-Moak Western Shoshone Indians of Nevada, Paiute Indian Tribe of Utah, Ohngo Gaudadeh Devia, and Utah Historic Trail Consortium and invited them to concur in this Agreement; and

WHEREAS this consultation has been coordinated to address other statutory and legal obligations including the American Indian Religious Freedom Act, the Native American Graves and Repatriation Act, Executive Order 13007, and the Archaeological Resources Protection Act; and

WHEREAS, pursuant to 36 CFR 800.2(c)(4), the cooperating Federal agencies have consulted with PFS, the applicant for the Project; and

WHEREAS, the cooperating Federal agencies, as part of the National Environmental Policy Act (NEPA) review process, have sought public comments and notified the public of the potential effects of the Project on historic properties as required in 36 CFR Part 800 and have considered the applicable requirements of Section 106 of the Act in the course of consultation; and

WHEREAS, the cooperating Federal agencies have consulted with the signatory parties, the concurring parties and others on (1) determinations regarding eligible properties and (2) potential adverse effects on historic properties within the APE; eight of these properties have been determined to be eligible for inclusion on the National Register of Historic Places through application of the criteria at 36 CFR 60.4 and as presented in Enclosure 1; and,

WHEREAS, a Class III Inventory, the purpose of which is the identification of prehistoric sites, historic sites and structures, and cultural landscapes that may be affected by the Project, has been conducted, and a report on the results of the Class III Inventory (the Report) has been provided to the cooperating Federal agencies, the SHPO, the other signatory and the concurring parties through submission to them in September and October 2000; and

WHEREAS, the cooperating Federal agencies, in consultation with the other signatory and concurring parties to this Agreement agree to avoid, minimize, or mitigate any adverse effects to historic properties; and the signatory and concurring parties have already agreed to mitigation measures that will be incorporated into a Treatment Plan to be approved by the signatory parties to mitigate any adverse effects to historic properties.

NOW, THEREFORE, the signatory parties agree that if approved, the Project shall be implemented in accordance with the following stipulations in order to take into account the effects of the Project on historic properties and that these stipulations shall govern the Project and all of its parts until the Agreement expires or is terminated.

STIPULATIONS

The cooperating Federal agencies agree that the following measures are to be carried out:

I. Development of Treatment Plan (for Eligible Resources)

a. PFS shall submit at Treatment Plan to the NRC. The Treatment Plan will identify (1) all eligible historic properties in the APE or segment thereof, (2) the nature of the effects to which each property will be subjected, and (3) the mitigation measures agreed to by the consulting and concurring parties as evidenced by NRC letter dated December 12, 2000 to Mr. John Parkyn, Chairman of the Board, PFS, to avoid, minimize, or mitigate the effects of the Project. The Treatment Plan will be submitted by the NRC to the other signatory and concurring parties for 30 day review. The Treatment Plan will be consistent with the Secretary of the Interior's "Standards and Guidelines for Archaeological Documentation" (48 FR 44734-37) and will take into account the Council's publication, "Treatment of Archaeological Properties" (1980). Unless any signatory party objects to the Treatment Plan within 30 calendar days after receipt of the plan, NRC shall ensure that it is implemented and construction shall be authorized to proceed in accordance with Stipulation II.

b. Should a signatory party object to the Treatment Plan within 30 calendar days of receipt, the issue shall be resolved in accordance with this Agreement's dispute resolution provision, Stipulation VI.

c. Failure to Comment on Treatment Plan

Failure to comment within 30 calendar days after receipt of the Treatment Plan will be presumed to represent concurrence with the Treatment Plan, except that the Treatment Plan may not be implemented before the BLM has issued an Archaeological Resources Protection Act (ARPA) permit authorizing the investigations required by the Treatment Plan.

d. Revisions to the Treatment Plan

If any signatory party requests revisions to the Treatment Plan, NRC shall provide the signatory parties to this Agreement 20 calendar days from receipt to review and comment upon the proposed revisions.

e. Treatment Plan Report Preparation and Review

Within 180 calendar days of completion of field work pursuant to the Treatment Plan, a report will be prepared incorporating all appropriate data analysis and interpretations. The report will be submitted to signatory and concurring parties; the signatory parties will be provided 30 calendar days to review and comment upon the report. Failure to comment within 30 calendar days after receipt of the report will be presumed to represent concurrence with the report.

II. Construction

a. Upon issuance of the authorizations requested from the cooperating Federal agencies, the cooperating Federal agencies will allow PFS to begin construction in those portions of the APE that have been subjected to the Class III Inventory and that are not within 200 feet of eligible historic properties.

b. Where eligible properties are present, PFS will notify the cooperating Federal agencies when treatment is completed for an area. Within 45 calendar days of notification, NRC will determine whether treatment has been satisfactorily completed and will notify PFS of its determination. If NRC does not notify PFS within the 45 calendar day time period, PFS may presume concurrence of NRC and the cooperating Federal agencies and proceed with construction in that area.

III. Discovery

a. A Discovery Plan for previously unencountered sites will be incorporated into the Treatment Plan. If a previously undiscovered archaeological, historical, or cultural property is encountered during construction or previously known properties will be affected in an unanticipated manner, all work will cease within 200 feet in all directions of the property until the cooperating Federal agencies can evaluate and, if necessary, authorize steps to mitigate impacts to the property. Evaluation and mitigation will be carried out in consultation with the signatory parties to this Agreement as expeditiously as possible in accordance with 36 CFR 800.13(b).

b. If cultural properties are encountered on Federal lands, the agency controlling the land will be consulted to develop appropriate mitigation measures. PFS will provide the construction contractor with written notification of the proper protocol for reporting discovery of previously unencountered sites.

IV. Changes in the Area of Potential Effects

a. If a change in the APE is determined to be necessary as a result of a substantial change in the Project design, the cooperating Federal agencies will initiate review, evaluation, and determination of effects in consultation with signatory and concurring parties and ensure that any such change is inventoried or treated in a manner consistent with this Agreement.

b. Where no historic property is present or will be affected, the cooperating Federal agencies shall consult with and submit documentation to the signatory and concurring parties. If all cooperating Federal agencies agree to the adequacy of documentation and no adverse comment from signatory parties other than the cooperating Federal agencies is received within 15 calendar days of receipt, the cooperating Federal agencies may assume concurrence.

c. Where an historic property will be affected and is the same property type as addressed in the Treatment Plan, PFS shall consult with and submit documentation to the signatory and concurring parties to determine applicability of the existing plan. If all cooperating Federal agencies agree to the adequacy of documentation and the determination and no adverse comment from signatory parties other than the cooperating Federal agencies is received within 15 calendar days of receipt, the cooperating Federal agencies may assume concurrence.

d. Where an historic property will be affected but is not the same property type as addressed by the Treatment Plan, PFS shall submit the Supplemental Treatment Plan to the signatory and concurring parties for review. If all cooperating Federal agencies agree to the adequacy of the Supplemental Treatment Plan and no adverse comment from signatory parties other than the cooperating Federal Agencies is received within 30 calendar days of receipt, the cooperating Federal agencies may assume concurrence. Once finalized, the Supplemental Treatment Plan will be submitted to the Council for its information

e. Should a signatory party object to a determination regarding applicability of the existing plan or a Supplemental Treatment Plan, NRC shall forward all documentation relative to the dispute to the Council and the issues shall be resolved in accordance with this Agreement's dispute resolution provision, Stipulation VI.

V. Confidentiality

a. The cooperating Federal agencies shall ensure that all sensitive material, as defined in Section 9 of the ARPA and Section 304 of the Act, is managed in such a way that historic properties, traditional cultural values, and sacred objects are not compromised, to the fullest extent available under law.

b. Each signatory and concurring party to this Agreement shall safeguard information about the nature and location of archaeological, historic, and traditional cultural properties and not reveal that information to any additional party, pursuant to Section 304 of the Act and Section 9 of the ARPA, without the express written permission of the cooperating Federal agencies.

VI. Dispute Resolution

a. Should any signatory party to this Agreement object to any actions pursuant to this Agreement within 30 calendar days of initiation of that action, the cooperating Federal agencies shall consult with the objecting party to resolve the objection. The objection must be identified specifically and the reasons for the objection documented. If the cooperating Federal agencies determine that an objection cannot be resolved, the NRC shall forward all documentation relevant to the dispute to the Council in accordance with 36 CFR 800.2(b)(2).

b. The Council will, within 45 calendar days of receipt of all pertinent documentation, provide the cooperating Federal agencies with a recommendation or comments related to the dispute. (Any comments provided by the Council and all comments from the parties to this Agreement will be taken into account by the cooperating Federal agencies in accordance with 36 CFR 800.7(c)(4) in reaching a final decision regarding the dispute).

c. Failure of the Council to provide a recommendation or comments pursuant to such a request shall indicate that the Council has waived its right to comment so that NRC can proceed with a determination regarding the dispute.

d. NRC shall make a determination regarding a dispute within 15 calendar days of receipt of Council recommendation, comments or the Council's waiver of its right to comment. The NRC will notify all parties of its decision in writing before implementing that portion of the Project subject to dispute under this stipulation. The NRC's decision will be final.

e. The cooperating Federal agencies' responsibilities to carry out all actions subject to the terms of this Agreement that are not the subject of the dispute remain unchanged.

f. Any recommendation or comments provided by the Council will be understood to pertain only to the subject of the dispute; and no additional work shall occur within 200 feet of the area of the dispute until resolution of said dispute. The cooperating Federal agencies' responsibility to carry out all actions under this Agreement that are not the subject of the dispute will remain unchanged.

VII. Effective Date

This Agreement shall become effective when executed by the authorized representatives of each party. This Agreement will become effective on the date that the cooperating Federal agencies receive the last signature from a signatory party. The cooperating Federal agencies shall ensure that each signatory and concurring party is provided with a copy of the fully executed Agreement.

VIII. Amendments

If any signatory of this Agreement determines that its terms will not or cannot be carried out or that an amendment to its terms is needed, that party shall immediately notify the cooperating Federal agencies and request an amendment. The signatory parties to this Agreement will expeditiously consult to consider such amendment in accordance with 36 CFR 800. 3(g).

IX. Termination

Any signatory party to this Agreement may terminate it by providing 30 calendar days notice, in writing, to the other parties, provided that the signatory parties will consult during the period prior to termination to seek agreement or amendments or other action that would avoid termination. In the event of a termination, the cooperating Federal agencies will comply with 36 CFR Part 800.4 through 800.7 to execute a new Agreement.

X. Term of Agreement

This Agreement will remain in effect until construction of the rail line and PFS facility ceases. Prior to that date, the signatories must consult if there are issues that require amendment or termination; otherwise the Agreement will automatically terminate after construction ceases unless it is amended or the expiration date extended by written agreement of the signatory parties.

XI. Failure to Carry Out Terms

Failure on the part of the cooperating Federal agencies to carry out the terms of this Agreement requires that the cooperating Federal agencies again request the Council's comments. If the cooperating Federal agencies cannot carry out the terms of this Agreement, they shall not sanction any action or make any irreversible commitment that would foreclose the Council's consideration of alternatives to avoid or mitigate adverse effects, until such time as the commenting process has been completed. Failure on the part of PFS to carry out the terms of this Agreement requires that PFS notify the cooperating Federal agencies. If PFS cannot carry out the terms of this Agreement, it shall not take any action that would result in any irreversible commitment that would foreclose the cooperating Federal agencies' consideration of alternatives to avoid or mitigate adverse effects.

XII. Execution of this Agreement

Execution and implementation of this Agreement evidences that the cooperating Federal agencies have afforded the Council a reasonable opportunity to comment on the Project and its effects on historic properties and that the cooperating Federal agencies have taken into account the effects of the Project on historic properties.

<u>SIGNATORY CONSULTING PARTIES</u>:

U.S. NUCLEAR REGULATORY COMMISSION

By:____
Date:____________________

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS

By:____
Date:____________________

390598.1 7

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

By:____
Date:____________________

U.S. SURFACE TRANSPORTATION BOARD

By:____
Date:____________________

SKULL VALLEY BAND OF GOSHUTES

By:____
Date:____________________

PRIVATE FUEL STORAGE, L.L.C.

By:____
Date:____________________

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By:____
Date:____________________

<u>INVITED CONCURRING PARTIES</u>:

CONFEDERATED TRIBES OF THE GOSHUTE RESERVATION

By:____
Date:____________________

390598.1 8

TRIBAL COUNCIL OF THE TE-MOAK WESTERN SHOSHONE INDIANS OF NEVADA

By:________________________________
Date:__________________

PAIUTE INDIAN TRIBE OF UTAH

By:________________________________
Date:__________________

UTAH HISTORIC TRAILS CONSORTIUM

By:________________________________
Date:__________________

OHNGO GAUDADEH DEVIA

By:________________________________
Date:__________________

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 19, 2001

Ms. Natalie Gochnour
Utah State Planning Coordinator
Room 116 State Capitol
Salt Lake City, UT 84114

SUBJECT: REQUEST FOR CONCURRENCE ON ELIGIBILITY DETERMINATION FOR THE ROCK ALIGNMENT AND CAIRN IDENTIFIED FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Ms. Gochnour:

In May and June of 1999 and in June 2000, a Private Fuel Storage, L.L.C. (PFS) contractor, P-III Associates, Inc., performed a Class III cultural resources inventory to identify historic properties in Skull Valley, Utah. PFS submitted this information to the U.S. Nuclear Regulatory Commission (NRC) staff in October 2000. For each site within the Area of Potential Effects, the report included eligibility recommendations for inclusion in the National Register of Historic Places (*National Register*). One site, 42TO1187, (rock alignment and cairn) was not evaluated for eligibility. By letter dated November 7, 2000, the NRC staff, in cooperation with the U.S. Department of Interior's Bureau of Indian Affairs (BIA) and Bureau of Land Management (BLM), and the Surface Transportation Board (STB) requested additional information about site 42TO1187, which is needed by the NRC staff and the cooperating agencies to complete the final review of the cultural resources in Skull Valley.

By letter dated January 25, 2001, PFS responded to the request for additional information. Attached to the letter was the result of an evaluation of the site performed by P-III Associates, Inc., and a map showing distances between the rock alignment and proposed rail centerline, right-of-way boundary, and construction easement boundary. PFS has concluded that site 42TO1187 is not eligible for listing on the *National Register*. Furthermore, PFS has realigned the rail line to avoid any direct or indirect effect on this site. The evaluation performed by P-III Associates is attached to this letter for your review.

The NRC staff and the cooperating agencies have reviewed the attached report and concur with the eligibility recommendation for site 42TO1187. The NRC staff and the cooperating agencies request your concurrence, within 30 days, on the eligibility recommendation in the report. If you do not respond within 30 days, we will assume you concur with the eligibility determination.

Exhibit B.5-25

N. Gochnour - 2 -

If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson-Ball (STB) at (202) 565-1530.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: 01/25/01 ltr from PFS

cc: PFS Service Lists

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 12136 West Bayaud Avenue, #330
Lakewood, Colorado 80226

April 20, 2001

Mark S. Delligatti
Senior Project Manager
Spent Fuel Licensing Section
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington D.C. 20555-0001

RE: *Draft Treatment Plan for Mitigation Measures and Discovery Plan for the Private Fuel Storage, Limited Liability Company (PFS) Proposed Spent Fuel Storage Installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians.*

Dear Mr. Delligatti:

On March 21, 2001, we received from your office a copy of PFS's proposed treatment plan for the mitigation of effects of the proposed Spent Fuel Storage Installation (ISFSI) on historic properties. Eight National Register-eligible properties will be affected by the undertaking, all on lands administered by the Bureau of Land Management. We have reviewed this draft, and offer the following comments for your consideration.

1. Page 8 - The section on *Interim Protection During Construction* requires PFS to pad the portion of U.S. Route 40 under the railroad bridge during construction of the rail line. The treatment plan should provide additional information on how this padding will be accomplished (e.g., what material, how thick, whether engineering tests are needed to predict compaction) to ensure protection of the integrity of U.S. 40. It should allow BLM to review and approve a more specific plan for padding the site when it is completed at a later date.

2. Page 8 - The last paragraph on this page requires PFS to erect temporary fences to keep construction activities off historic properties outside of the construction corridor. The fencing should be more clearly described in this document (e.g, how high, what materials?) As suggested above, the BLM should be provided an opportunity to review and approve the fence construction plans.

3. Page 9 - Development of Educational materials for the Goshute Indians. BLM staff archaeologist, Laird Naylor, has expressed concern that this mitigation measure may not be appropriate given that no properties of traditional cultural value to the Skull Valley Band, nor any historic properties on the Skull Valley Reservation, will be affected by the undertaking. The

Exhibit B.5-26

Council believes that the BLM has raised a good point. The stipulation is not at all clear about what is intended for the educational exhibit, and the mitigation is not directly related to the projects effects on historic properties. However, we do not necessarily oppose including this as a mitigation measure if other parties to consultation feel there is good reason for requiring it.

4. Page 10 - Interpretive Kiosk or Wayside Exhibit for the Emigrant Trail/Hastings Cutoff: This section is unclear about who will develop the brochures and wayside exhibit. This should be specified in the Treatment Plan, and it should be a person or persons meeting professional qualifications standards.

Thank you for providing us an opportunity to review this draft Treatment Plan. If you have any questions or concerns regarding these recommendations, please contact Carol Gleichman of our staff at (303) 969-5110.

Sincerely,

Don L. Klima
Director
Office of Planning and Review

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 19, 2001

Mr. Jere Krakow, Superintendent
National Park Service
Long Distance Trails Office
324 South State Street, Suite 250
P.O. Box 45155
Salt Lake City, UT 84145-0155

SUBJECT: REVIEW OF MEMORANDUM OF AGREEMENT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY

Dear Mr. Krakow:

By letter dated December 1, 2000, the staff of the U.S. Nuclear Regulatory Commission (NRC), in cooperation with the U.S. Department of Interior's Bureau of Indian Affairs (BIA) and Bureau of Land Management (BLM), and the Surface Transportation Board (STB), (collectively, the cooperating Federal agencies), requested your concurrence on the determination of adverse effects on properties that are eligible for inclusion in the National Register of Historic Places (*National Register*). As a consequence of the finding of adverse effect, the cooperating Federal agencies developed a draft Memorandum of Agreement (Agreement) that outlines agreed-upon measures that Private Fuel Storage, L.L.C. (PFS) will take to avoid, minimize, or mitigate these adverse effects. The cooperating Federal agencies previously requested your comments regarding the draft Agreement. Based on the comments received from the consulting parties, the Agreement was revised. Enclosed for your review is a copy of the revised Agreement (Enclosure 1). The cooperating Federal agencies request your review and comments, within 10 days, on the revised Agreement. If you do not respond within 10 days from the receipt of this letter, we will assume you have no comments on the revised Agreement. Once all comments are received, reviewed, and incorporated, as appropriate, the cooperating Federal agencies will forward a copy of the final Agreement to the consulting parties for either signature or concurrence.

As you are aware, a stipulation of the Agreement is for the development of a Treatment Plan and a Discovery Plan. The Treatment Plan will identify (1) all *National Register* eligible properties in the Area of Potential Effect, (2) the nature of the effects to which each property will be subjected, and (3) the mitigation measures agreed to by the consulting parties. The mitigation measures will be based upon the measures outlined in the NRC letter dated December 12, 2000, to Mr. John Parkyn, Chairman of the Board, PFS (Enclosure 2). The Discovery Plan will identify the process PFS must follow if a historic, archeological, or cultural property is encountered during construction or operation of the proposed PFS Facility or rail line. Once the Treatment Plan and Discovery Plan have been finalized, they will be forwarded for your review and comment.

Exhibit B.5-27

J. Krakow -2-

If you have any questions, please contact Scott Flanders (NRC) at (301) 415-1172, Laird Naylor (BLM) at (801) 977-4357, Garry Cantley (BIA) at (602) 379-6750, or Phillis Johnson-Ball (STB) at (202) 565-1530.

Sincerely,

Mark S. Delligatti

Mark S. Delligatti, Senior Project Manager
Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-22

Enclosure: 1. Revised Draft Memorandum of Agreement
2. 12/12/00 ltr from NRC (ML003778377)

cc: PFS Service Lists

Private Fuel Storage, L.L.C.

7677 East Berry Ave., Englewood, CO 80111-2137
Phone 303-741-7009 Fax: 303-741-7806
John L. Donnell, P.E., Project Director

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

June 28, 2001

REVIEW OF MEMORANDUM OF AGREEMENT
DOCKET NO. 72-22 / TAC NO. L22462
PRIVATE FUEL STORAGE FACILITY
PRIVATE FUEL STORAGE L.L.C.

Reference: U.S. NRC Letter, Delligatti to Parkyn, "Review of Memorandum of Agreement for the Proposed Private Fuel Storage Facility", dated June 19, 2001

In the referenced letter, the Nuclear Regulatory Commission (NRC) provided Private Fuel Storage, L.L.C. (PFS) with a draft Memorandum of Agreement (MOA) that outlines measures PFS will take to avoid, minimize, or mitigate the potential effects of the Private Fuel Storage Facility on properties that are deemed eligible for inclusion in the National Register of Historic Places. PFS has submitted comments on earlier iterations of the MOA and acknowledges that certain of its comments have been incorporated into the revised text. PFS has additional comments on the revised version of the MOA. Those comments are included in the attachment and are not an effort to resubmit comments already reviewed. However, PFS notes that there have been changes to the MOA that warrant consideration of the following three overarching issues.

First, the MOA now identifies BLM as the lead agency for purposes of its implementation. PFS requests that BLM identify the process whereby the MOA will be finalized and executed by all necessary parties in a timely fashion. Specifically, PFS would like to understand the time period for signatory parties to execute the MOA or in the alternative, the procedure for finalizing the MOA absent those signatures.

Second, the MOA retains language that does not reflect the ongoing efforts to comply with the cooperating federal agencies' requests. Specifically, Stipulation I. still requires that a Treatment Plan be developed. In fact, the Treatment Plan has already been drafted and was submitted to the cooperating federal agencies in March of 2001. Accordingly, references to Treatment Plan development and revisions are no longer appropriate. PFS has included revisions to Stipulation

413567.2

Exhibit B.5-28

U.S. NRC 2 June 28, 2001

I. in the attachment that accurately reflect the current status of the Treatment Plan implementation.

Third, PFS notes that the role of the concurring parties in the MOA is, in some instances, inconsistent with the regulations implementing Section 106 of NHPA. Those regulations establish that only signatory parties can terminate, execute or amend an MOA. 36 C.F.R. § 800.6(c)(1). Accordingly, PFS maintains that the MOA ought to incorporate a consistent role for the concurring parties and has attached specific comments that include, among other things, references to the overbroad provisions in the MOA.

Thank you for the opportunity to comment on the development of the MOA. PFS would like to respond to questions or comments on the MOA and would welcome an opportunity to discuss the suggested changes and clarifications in a conference call.

If you have any questions regarding this matter, please contact me at 303-741-7009.

Sincerely,

John L. Donnell

John L. Donnell
Project Director
Private Fuel Storage L.L.C.

Attachment

Copy to (with enclosure):
- Mark Delligatti
- Scott Flanders
- John Parkyn
- Jay Silberg
- Sherwin Turk
- Greg Zimmerman
- Scott Northard
- Denise Chancellor
- Richard E. Condit
- John Paul Kennedy
- Joro Walker

COMMENTS ON REVISED MEMORANDUM OF AGREEMENT FOR THE PROPOSED PRIVATE FUEL STORAGE FACILITY (June 19, 2001)

**WHEREAS Clause (Fourth) and Enclosure 1: "the cooperating Federal agencies have determined that the Project will have adverse effects on historic properties within the APE . . .a list of these properties and their eligibility and effect determinations are presented in Enclosure 1. . . ."

Enclosure 1 currently consists of the December 12, 2000 mitigation agreement letter and a list of sites. It does not identify the eligibility and effect determinations; as such, the enclosure ought to be substituted with the appropriate supporting documentation. Additionally, the revised enclosure and existing Enclosure 1 ought to be amended to specify that 42TO1187 is not eligible for inclusion on the National Register of Historic Places; that site has already been addressed and determined to be ineligible in detailed analysis prepared by P-III Associates, Inc., (dated January 24, 2001). Existing Enclosure 1 ought to also specify that 42TO709 is not eligible for inclusion on the National Register of Historic Places. That site is referenced as consisting of a rock cairn and alignment that require further evaluation. Presumably, 42TO709 ought to have really referenced 1187 and as noted above, that site is not eligible for listing.

**WHEREAS Clause (second to last) and Signatory/Concurring Party Page: "the cooperating Federal agencies have consulted with the Confederated Tribes of the Goshute Reservation . . . the Paiute Indian Tribe of Utah. . . ." (emphasis added).

The Paiute have been removed as a signatory or concurring party. Should the reference be stricken or the tribe added as a concurring party?

** Stipulation I. Revise to read as follows:

I. Implementation of Treatment Plan (for Historic Properties)

PFS shall implement a Treatment Plan for the treatment of the effects of the undertaking on the historic properties identified in Enclosure 1 of this Agreement to the BLM.

a. The Treatment Plan, entitled Treatment Plan for Mitigation Measures for Eight Historic Properties and a Discovery Plan for the Private Fuel Storage Project, Skull Valley, Utah, dated March, 2001, identifies (1) all *National Register* eligible properties in the APE, (2) the nature of the effects to which each property will be subjected, and (3) the mitigation measures to avoid, minimize, or mitigate the effects of the Project agreed to by the parties. The Treatment Plan is consistent with the Secretary of the Interior's "Standards and Guidelines for Archaeological Documentation" (42 Fed. Reg. 44734-37), and takes into account the Council's publication, "The Council's Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites (*Federal Register* Vol. 64, No. 95, May 18, 1999)." The Treatment Plan incorporates the required mitigation measures from the letter dated December 12, 2000, from NRC to PFS (see Enclosure 1 of this Agreement).

b. Treatment Plan Report Preparation and Review

413567.2 1

Within 180 calendar days of completion of field work pursuant to the Treatment Plan, PFS will submit a report to BLM incorporating all appropriate data analysis and interpretations. BLM will submit the report to signatory and concurring parties who will be provided 30 calendar days to review and comment on the report. Failure to comment 30 calendar days after receipt of the report will be presumed to represent concurrence with the report. Upon BLM concurrence that that the treatment has been satisfactory completed, BLM will notify PFS and the other cooperating Federal agencies. BLM will then allow construction to proceed in and around the resource area.

**Stipulations I.e. and II.b. Stipulations I.e. (in current draft) and II.b. both address the same issue. Stipulation II.b. is redundant. As drafted, Stipulation I.e. provides that PFS must submit a report to BLM after competing fieldwork and that BLM and other parties have 30 calendar days to comment on that report. Accordingly, Stipulation II.b. could be stricken. The reference to BLM approval of construction has been incorporated into the redline of Stipulation I.e. Alternatively, the agencies ought to incorporate the same time periods for BLM concurrence into Stipulation II.b. as are in Stipulation I.e. Specifically, Stipulation I.b. would state that "*within 30 calendar days after receipt of the Treatment Plan Report, BLM shall review the document. Failure to comment within the 30 calendar days will be presumed to represent concurrence with the report and authorization to proceed with construction in and around the resource area.*"

**Stipulation III.a. Amend the first line as follows: A Discovery Plan for previously unencountered sites *has been incorporated into* the Treatment Plan. Additionally, all references to the cessation of construction should also specify that it only applies within 200 feet of the resource. "For example, 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 *within 200 feet of the resource* . . . If PFS identifies any previously unrecorded or other cultural resources during construction activities on the Reservation . . . PFS shall immediately cease construction *within 200 feet of the resource. . . .*

**Stipulation III.b. Add to the sentence the following: *consistent with recovery procedures identified in the Discovery Plan.*

**Stipulation III.c. Add the following to the beginning of the sentence: *As established in the Discovery Plan,* PFS will provide. . . .

**Stipulation VI.b. The Council comment period is not well defined. It would appear that the Council has 45 calendar days to comment (in accordance with 800.7). It is unclear why subsection 2 is required and it should be stricken. Subsection 1 could be amended to state: Provide BLM with a *recommendation or comments in accordance with 36 CFR Part 800.7* (followed by the remainder of that subsection).

**Stipulation VI.c. Consistent with the remainder of the revised Agreement, it would appear that the final sentence ought to state: *BLM's* (not the cooperating Federal Agencies') decision will be final.

**Stipulation VI.e. For reasons outlined in the transmittal letter, this provision ought to be stricken. A concurring party does not have the same role and opportunity to dispute the implementation of the MOA as do the signatory parties. To provide such a role, undermines the purpose of distinguishing signatory parties who can amend an agreement from concurring parties who were afforded an opportunity to consult throughout the Section 106 process up to the development of the agreement. Alternatively, should the parties determine to include such a provision, BLM should be required to resolve the objection or make a determination regarding the objection within 15 calendar days.

**Stipulation VIII. The second line ought to specify that signatory parties will expeditiously consult to consider the proposed amendment since only signatory parties can amend the terms of the agreement.

STATE OF UTAH

MICHAEL O. LEAVITT
GOVERNOR

OFFICE OF THE GOVERNOR
SALT LAKE CITY
84114-0601

OLENE S. WALKER
LIEUTENANT GOVERNOR

June 29, 2001

Mark S. Delligatti, Senior Project Manager
Licensing Section
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Delligatti,

RE: June 19, 2001, Letter From NRC Regarding Review Of Memorandum Of Agreement Concerning National Historic Preservation Act Planning Processes For The Proposed Private Fuel Storage Facility

The State of Utah has received your letter of June 19, 2001 addressed to Natalie Gochnour, State Historic Preservation Officer for this proposal. Ms Gochnour recently undertook new responsibilities within my Office, and will no longer be serving in the SHPO role, nor that of the Utah State Planning Coordinator. Until the best replacement is found, correspondence related to the historic aspects of this project should be sent to Ms. Lynne Ward, Governor's Office of Planning and Budget (same address as Ms. Gochnour).

The State is reviewing the proposed revised Memorandum of Agreement, and fully intends to provide timely comments. However, we will not be able to provide these comments within 10 days of receipt of your letter. It is important that all parties have adequate time to review the proposals. The 10-day response period proposed is too restrictive, and precludes the careful review required by law. The State will not unnecessarily delay its comments either, and will strive to have its review completed as soon as is feasible.

The proposed Memorandum raises serious questions about BLM planning and authority to conduct such planning, the timing and conduct of work contemplated under the Memorandum prior to the required amendments to the BLM's Resource Management

Exhibit B.5-29

Page 2

Plan for the area, and the adequate protection of historic properties. Further, the MOA appears seriously deficient in terms of the established role of the State Historic Preservation Officer in these matters.

Sincerely,

Michael O. Leavitt
Governor

cc: L. Ward

MOL:DRN:dco

United States Department of the Interior

NATIONAL PARK SERVICE
CALIFORNIA, MORMON PIONEER, OREGON & PONY EXPRESS NATIONAL HISTORIC TRAILS
Long Distance Trails Office
324 South State Street, Suite 250
Post Office Box 45155
Salt Lake City, Utah 84145-0155

IN REPLY REFER TO:

July 5, 2001

Mark S. Delligatti
Spent Fuel Licensing Section
Licensing and Inspection Directorate
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: TAC No. L22462 and Docket No. 72-22

Dear Mr. Delligatti:

We appreciate the opportunity to respond to your letter dated June 19th, regarding the review of the Memorandum of Agreement for the proposed Private Fuel Storage facility in Skull Valley. Due to my travel schedules the 10-day reply date could not be met, thus this response has been delayed.

The proposed elements of the agreement seem consistent with discussions held in meetings with your staff, except for the matter of cultural (historic) landscape. Once again it is necessary to call this to your attention (see letters dated November 10, 2000, and December 18, 2000).

Notably lacking in the Memorandum of Agreement is the matter of cultural landscapes. It is a very significant resource in Skull Valley and one enumerated in the *Comprehensive Management Plan* (1999) for the California National Historic Trail, and brought out in meetings with the Nuclear regulatory Commission and in letters to you (see above).

Cultural landscape merits inclusion in the Memorandum of Understanding.

Sincerely,

Jere L. Krakow

Jere L. Krakow
Superintendent

Exhibit B.5-30

Cc: Laird Naylor, Salt Lake District Office, Bureau of Land Management
Ron Andersen, Chairman, Utah Historic Trails Consortium
Wilson Martin, Deputy State Historic Preservation Officer
Garry J. Cantley, Western Regional Office, Bureau of Indian Affairs

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 12136 West Bayaud Avenue, #330
Lakewood, Colorado 80226

July 6, 2001

Mark S. Delligatti
Senior Project Manager
Spent Fuel Licensing Section
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington D.C. 20555-0001

RE: *Final Draft MOA for the Private Fuel Storage, Limited Liability Company (PFS) Proposed Spent Fuel Storage Installation (ISFSI) on the Reservation of the Skull Valley Band of Goshute Indians.*

Dear Mr. Delligatti:

On June 21, 2001, we received from your office the revised draft Memorandum of Agreement (MOA) for the above referenced project. We have reviewed this draft and find that your staff has done an excellent job of incorporating our earlier comments. We offer the following additional comments for your consideration in finalizing this agreement:

1. The 4th WHEREAS is a bit misleading, as it refers to an inaccurate list of properties and their eligibility currently contained in Enclosure 1. As stated by PFS, in its comments of June 28, 2001, the letter and mitigation proposal which currently comprise Enclosure 1, do not include the most up-to-date information on site eligibility. We agree with PFS that Enclosure 1 should be substituted with an appropriate supporting document that includes an accurate list of properties, eligibility and effects determinations. We also would like to see this enclosure include the most recent draft Treatment Plan and Discovery Plan for this project.

2. Stipulation I.a. may need to be revised to accurately reflect the contents of the revised Enclosure 1.

3. The first sentence of Stipulation IX (Termination) is confusing and should be deleted.. It refers to automatic termination and an expiration date which are not otherwise provided for in the agreement. We believe that the rest of the stipulation covers the necessary consultation to try to avoid termination.

Exhibit B.5-31

Thank for providing us an opportunity to review this draft MOA. If you have any questions or concerns regarding these recommendations, please contact Carol Gleichman of our staff at (303) 969-5110.

Sincerely,

Lee Keatinge

for Don L. Klima
Director
Office of Planning and Review

State of Utah

GOVERNOR'S OFFICE OF PLANNING AND BUDGET

Michael O. Leavitt
Governor
Lynne N. Ward, CPA
Director
Brad T. Barber
Deputy Director

116 State Capitol Building
Salt Lake City, Utah 84114
(801) 538-1027
Fax: (801) 538-1547

August 6, 2001

Mark S. Delligatti, Sr. Project Manager
Licensing Section, Licensing & Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
US NRC
Washington DC 20555-0001

Dear Mr. Deligatti:

Re: State Historic Preservation Officer's Response to Proposed Memorandum of Agreement Concerning Historic Preservation Activities on or near the proposed Private Fuel Storage High Level Nuclear Waste Storage Facility in Utah

The State of Utah and the State Historic Preservation Officer have reviewed the draft Memorandum of Agreement concerning historic preservation activities on or near the proposed high level nuclear waste storage facility within the State of Utah. We have serious concerns regarding the draft MOA, and do not believe it correctly reflects the law, nor proper procedure. These defects are fundamental, and jurisdictional, to one of the proposed parties - the Bureau of Land Management - and perhaps to others. The state of Utah believes the proposed MOA is prematurely proposed, and cannot be executed at this time. Our concerns are summarized as follows:

1. The MOA requires agreement with a conclusion which, by factual timing within the regulatory process, is not true. The first paragraph ("Whereas") states that the NRC, BIA, BLM, and STB "propose to approve" the PFS project described in the preferred alternative of the Environmental Impact Statement (EIS). Although it is true that the parties "propose to approve" the proposed project, such approval is not yet given. Pending the final decision on the EIS and the final project description, it is illegal for the agencies to act to in any manner to implement a "preferred " alternative.

2. The BLM has responsibility for management of federal lands in Skull Valley, including those lands identified in the proposed rail and the proposed intermodel transfer facilities.

Exhibit B.5-32

However, the BLM has not yet amended the Pony Express Area Resource Management Plan (RMP) to allow for any aspect of the proposed project, including the actions proposed in this MOA. Further, the proposed MOA constitutes a planning activity by BLM, and contemplates numerous additional planning activities on the part of the BLM. Congress has prohibited the BLM from conducting any planning activities, or implementing any planning activities, or amending any RMPs until a full review and evaluation of those impacts on the Utah Test and Training Range is completed. Hence, BLM is precluded from participating in the activities contemplated by this MOA, and in executing the MOA.

3. Automatic, inflexible, presumptive triggers in the MOA would operate in violation of BLM regulation and policy. BLM is required to make reviews and affirmative decisions if a plan or action is to be authorized. A defacto approval does not meet that requirement. A trigger date for time frame, such as the + 30-day presumptive approval under 1.a-c of the stipulations, without the requirement for written response, and without opportunity to extend or modify the process or the time frame, will not comply with proper decision-making procedures and responsibilities.

4. The MOU improperly allows activities in anticipation of the construction of the rail line to proceed prior to a final decision authorizing or rejecting the PFS facility, which represents the sole destination of the rail line. Construction within the BLM right-of-way, prior to assurance that the facility will be authorized and built, constitutes unnecessary and undue degradation of federal lands and cannot be justified.

5. The entire process of planning, evaluating, and authorizing activities in anticipation of construction has failed to include or provide for participation by and regulatory authority of the Utah Department of Transportation (UDOT). State statute and rules require UDOT approval of all railroad crossings of roads. There are numerous roads which will be transected by the proposed rail line. Both the National Environmental Policy Act (NEPA) and BLM planning procedures require evaluation and consistency with State laws. This has not been accomplished.

6. The MOA purports to make statements about the effects of the proposed MOA on the government-to-government relationship among the federal agencies and the sovereign tribal entity. Although these statements may be true, the MOA does not accurately reflect United States Supreme Court law concerning the authority of the state of Utah within the boundaries of the reservation. The Supreme Court's case law authorizes state authority over non-Indians within the reservation, and for state taxation of non-tribal assets. In this regard, at a minimum, the entire MOA process does not require all relevant parties to insure that the requirements of state law concerning fees and taxes due by contractors are properly implemented.

7. The State Historic Preservation Officer further asserts that the MOA insufficiently delineates the Area of Potential Effect. The SHPO asserts that the NRC must consider the Dugway Proving Ground and the Air Force Test Range as eligible properties, as they

are vital World War II and Cold War sites which could be adversely affected by the proposed action.

8. Part X incorrectly delineates the responsibilities of the BLM, the SHPO, and the Advisory Council. The parties to the MOA have no authority to unilaterally redefine the correct relationship among these three entities. This clause would need to be rewrittten at the proper time for execution of the MOA, if ever.

We appreciate the opportunity to comment, and your attention to these matters. If you have further questions, please contact me at (801) 538-1027.

Sincerely,

Lynne Ward

Lynne Ward
Acting State Historic Preservation Officer for the
Private Fuels Storage Proposal

copies:
US Department of Interior, BLM
US Department of Interior, BIA
US Surface Transportation Board
Skull Valley Band of Goshutes
Private Fuel Storage
Advisory Council on Historic Preservation
Confederated Tribes of Goshute Reservation
Tribal Council of the Te-Moke Western Shoshone Indians of Nevada
Utah Historic Trails Consortium
Ohngo Gaudedeh Devia

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APPENDIX C

RAIL ROUTES TO THE PROPOSED PFSF SITE

As part of the evaluation of potential impacts in this final environmental impact statement (FEIS), an analysis was performed using the INTERLINE routing code and the RADTRAN risk assessment code (see Appendix D) to determine the transportation impacts associated with the rail shipment of commercial spent nuclear fuel (SNF). As described in this appendix, the INTERLINE computer code model was used to select rail routes and analyze the transportation scenarios.

Because of the size and weight of the SNF shipping casks included in the license application for the proposed Private Fuel Storage Facility (PFSF), it is assumed that all SNF will be shipped from existing reactor sites to the PFSF by rail. While shipment of SNF by truck over highways is possible, the size of the proposed shipping cask system to be used for the proposed facility makes the use of rail transportation essential for the transport of SNF. It should be noted that individual reactor licensees may need to move SNF form their sites by heavy-haul vehicles or barge in order to transfer SNF to railheads near their reactors.

C.1 Identification and Selection of Routes

The INTERLINE computer code was used to select routes and analyze the transportation scenarios (Johnson 1993). The INTERLINE model is designed to simulate routes on the rail system in the United States, and its database includes all railroads in the country. Several different routing options are available in the INTERLINE program, including “optimal” routes and alternative routing. The model can be modified to change routing parameters and interchange penalties (as explained below) between different railroad companies. Additional detailed routing analysis can be performed by blocking individual or sets of rail segments or intersections contained in the database.

The INTERLINE code selects routes based on several factors. The model maximizes the use of rail lines that are used for higher density traffic. If several railroads are available, the model minimizes the number of railroads used in the route. This is accomplished by placing a penalty for interchanges between railroad systems. Also, the originating railroad is preferentially used to maximize the distance traveled on their system.

The INTERLINE code was used to select routes accessing the proposed PFSF site in Skull Valley, Utah, as well as an alternate site in Wyoming. Section C.2 describes the routes in Utah, while Section C.3 discusses the Wyoming routes. Output pages from the INTERLINE code for these routes are provided in Sections C.4 and C.5. These output pages supply additional information including a listing of each rail route, as well as mileage and population density information.

In addition to the routes near the Skull Valley and Wyoming sites, a set of cross-country routes available from the Maine Yankee nuclear reactor (in Maine) was also identified. These cross-country routes are discussed in Section C.2. The INTERLINE output for the routes is displayed in Sections C.7 to C.13, which include cross-country routes to both Skull Valley and Wyoming, as well as the routes away from these locations toward the proposed candidate repository at Yucca Mountain, Nevada.

C.2 Rail Route From Maine Yankee to Skull Valley, Utah

For the purposes of this study, a representative route was chosen for analysis rather than analyzing all routes between every reactor and the Skull Valley site. The Maine Yankee reactor (in Maine) was selected for this analysis because it is one of the most distant reactors from the proposed PFSF. This route is shown in Figure C.1, is 4,476 km (2,781 miles) long, and involves five railroad companies. The Maine Coast Railroad (reporting mark MC) provides service to the Maine Yankee site and would transport the SNF shipment from the site to Brunswick, Maine, a distance of 50 km (31 miles). Traffic density on the MC is very low, less than 1 million gross ton-miles per mile (MGTM) annually, and this line is single track with no signal system. At Brunswick the shipment is transferred from MC to the ST Rail System (reporting mark ST). The ST Rail System would move the shipment for 472 km (293 miles) from Brunswick through southwestern Maine, southeastern New Hampshire, northern Massachusetts, to Mechanicville, New York, north of Albany. From Brunswick to near Portland, Maine, traffic density is less than 1 MGTM and the line is single track with no signals. From near Portland to Lawrence, Massachusetts, traffic density is between 5 to 10 MGTM and the line is single track with centralized traffic control (CTC) signals. Between Lawrence and Mechanicville, traffic density is 10 to 20 MGTM and the line is single track with CTC signals. At Mechanicville, the shipment would be transferred from ST to the St. Lawrence and Hudson operating subsidiary of the Canadian Pacific Railway (reporting mark CPRS). CPRS would move the shipment for 568 km (353 miles) between Mechanicville and Buffalo, New York, where the shipment would be transferred to the Norfolk Southern Railway (reporting mark NS). From Mechanicville to Binghamton, New York, traffic density is 10 to 20 MGTM and the line is single track with automatic block system (ABS) signals. The portion of the route between Binghamton to Buffalo has a traffic density of 20 to 30 MGTM and is primarily single track with a mixture of ABS and CTC signals. NS would handle the shipment for 851 km (529 miles) from Buffalo to Chicago where the shipment would be interchanged to the final carrier, the Union Pacific Railroad (reporting mark UP). The NS line between Buffalo and Chicago handles over 40 MGTM and is a mixture of single and double track with CTC signals. The UP would handle the shipment for 2,536 km (1,576 miles) from Chicago, through Illinois, Iowa, Nebraska, a short segment in Colorado, Wyoming, to the Skull Valley site in Utah. Traffic density from Chicago to west of Salt Lake City is over 40 MGTM. This segment of the route varies from single to double to triple track and signaling is either CTC or ABS. From Garfield, west of Salt Lake City to the spur to the Skull Valley site, traffic density is between 30 and 40 MGTM and the line is single track with CTC signals. The new 51-km (32-mile) rail line to the Skull Valley site would be single track with no signals and would have less than 1 MGTM annually.

Routes from the proposed PFSF to a Permanent National Repository. Congress, in the Nuclear Waste Policy Act, as amended (NWPA), has directed the DOE to study one candidate repository, namely, a repository proposed at Yucca Mountain, Nevada. To reflect the provisions of the NWPA, the NRC staff has examined the shipment of SNF via rail from the proposed PFSF, on its way to a permanent repository in the western United States, as if such a repository were located at Yucca Mountain, Nevada, although that location may or may not become the actual repository. Accordingly, the NRC staff examined the shipment of SNF via rail from the alternative Wyoming site to the Utah-Nevada border. The route analyzed in this FEIS stopped at the Utah-Nevada border because shipment plans beyond the border are subject to decisions of the DOE that have not yet been made (for example, the locations of intermodal transfer points or new direct-access rail lines). It should be

noted that the NRC has not received an application requesting a license for a permanent geological repository, and the NRC has not made any determination regarding any proposal to construct such a

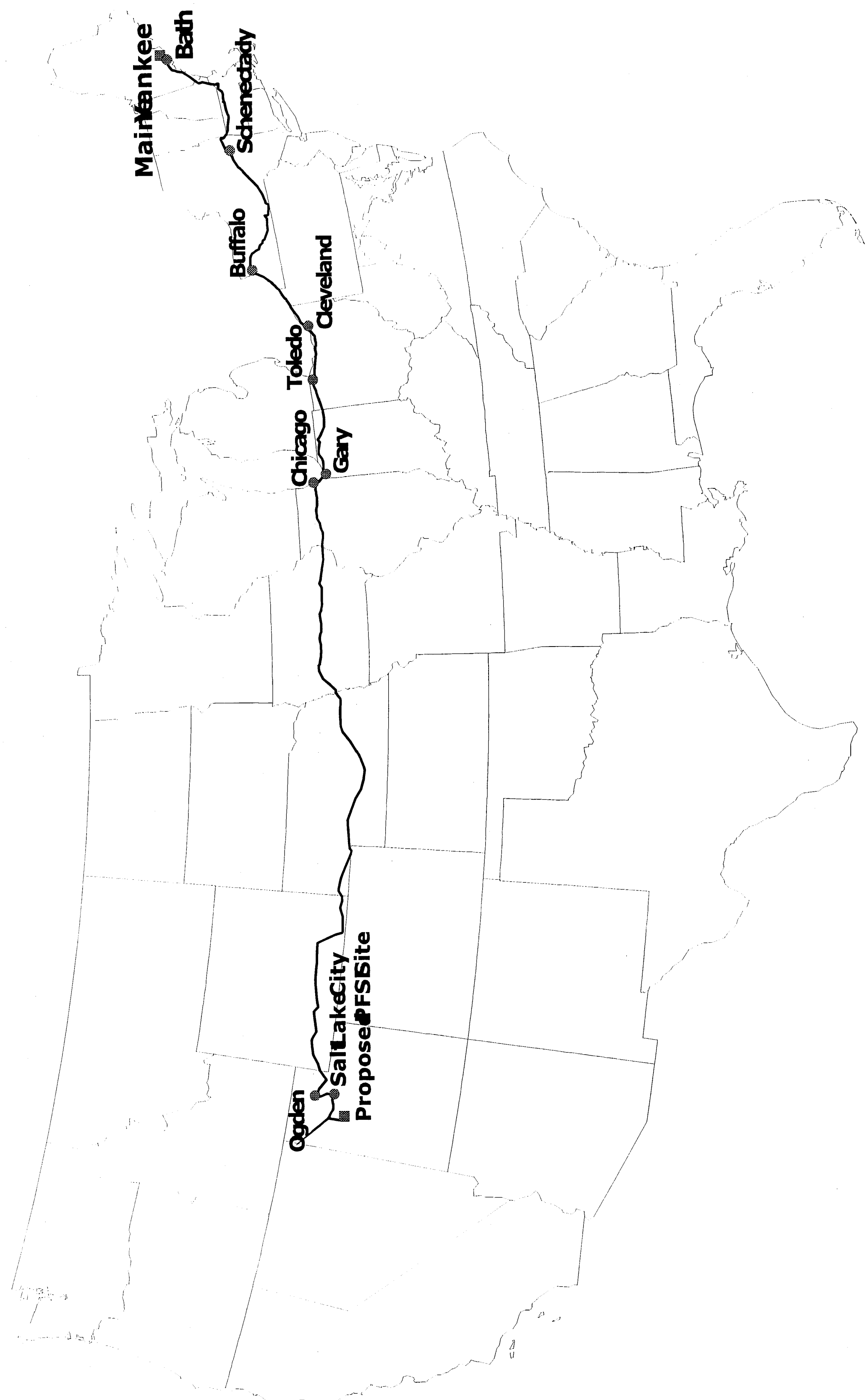

Figure C.1. Rail route from the Maine Yankee nuclear power plant to Skull Valley, Utah.

repository at Yucca Mountain, Nevada, or any other location.

This section describes the routes from the PFSF to the Utah-Nevada border on its way to a final repository in the western United States. If a new rail line is constructed linking the Union Pacific railroad main line to the Skull Valley site, shipments of SNF will move entirely by rail from Skull Valley to the Utah-Nevada state line in southwestern Utah (see Figure C.2). This route is 569 km (354 miles) long. The first 51 km (32 miles) of the route is on the rail line from the Skull Valley site to the UP mainline at Skunk Ridge. From Skunk Ridge, the route follows the UP Railroad east to Garfield and then south on another UP line through Lynndyl, Utah, to the Nevada state line in southwestern Utah near at a siding named Uvada. Traffic density from Skunk Ridge to Lynndyl is between 30 and 40 MGTM and from Lynndyl to the Nevada state line the traffic density increases to over 40 MGTM. This entire route is single track with CTC signaling.

C.3 Routes Near Skull Valley, Utah

Currently, there is no direct rail access to the proposed ISFSI site. This analysis assumes that a new 51-km (32-mile) rail line would be constructed from Skunk Ridge (located northeast of the proposed PFSF site and near the Low passing siding) to the proposed ISFSI site. The Union Pacific Railroad owns the existing rail line at Skunk Ridge.

For this study, rail access routes and route lengths were selected to cross the Utah state borders, where possible, and to accommodate convergence points from rail lines farther away from the proposed PFSF site. Five different access routes potentially could be used to reach the proposed site in Skull Valley, Utah (see Figure C.3). The actual distance of the identified routes varies from 330 km (220 miles) to 385 km (239 miles) due to the structure of the INTERLINE rail routing network. Note in Figure C.3 that the Skunk Ridge location may not appear to show precisely where the proposed rail line would leave the Union Pacific main line. The new rail line does intersect the main line at the Skunk Ridge location, but the new line closely parallels the main line for the first several miles. This is not visible in the figure due to the scale of this map.

The characteristics of each of the five routes, as described below, include information on the length of the route, the number of main tracks, the signaling of the line, and the volume of traffic density. These factors provide an indication of the capacity that each line segment can handle. Signals on railroads provide an additional margin of safety and greatly influence the number of trains that can operate over a line. Three general types of rail signaling are used in the United States. CTC is the most advanced type of signaling. With CTC, the dispatcher can control operations over a line with signal indications, and movements into passing sidings are assisted by remote controlled switches operated by the dispatcher. ABS is considerably less sophisticated than CTC. With ABS signals, the dispatcher controls train movements with orders provided by radio communication, and block signals provide indications to train crews whether another train is occupying a nearby rail segment. The third type of signal is no signal system. Rail operations are totally dependent upon radio communications between the train crew and the dispatcher.

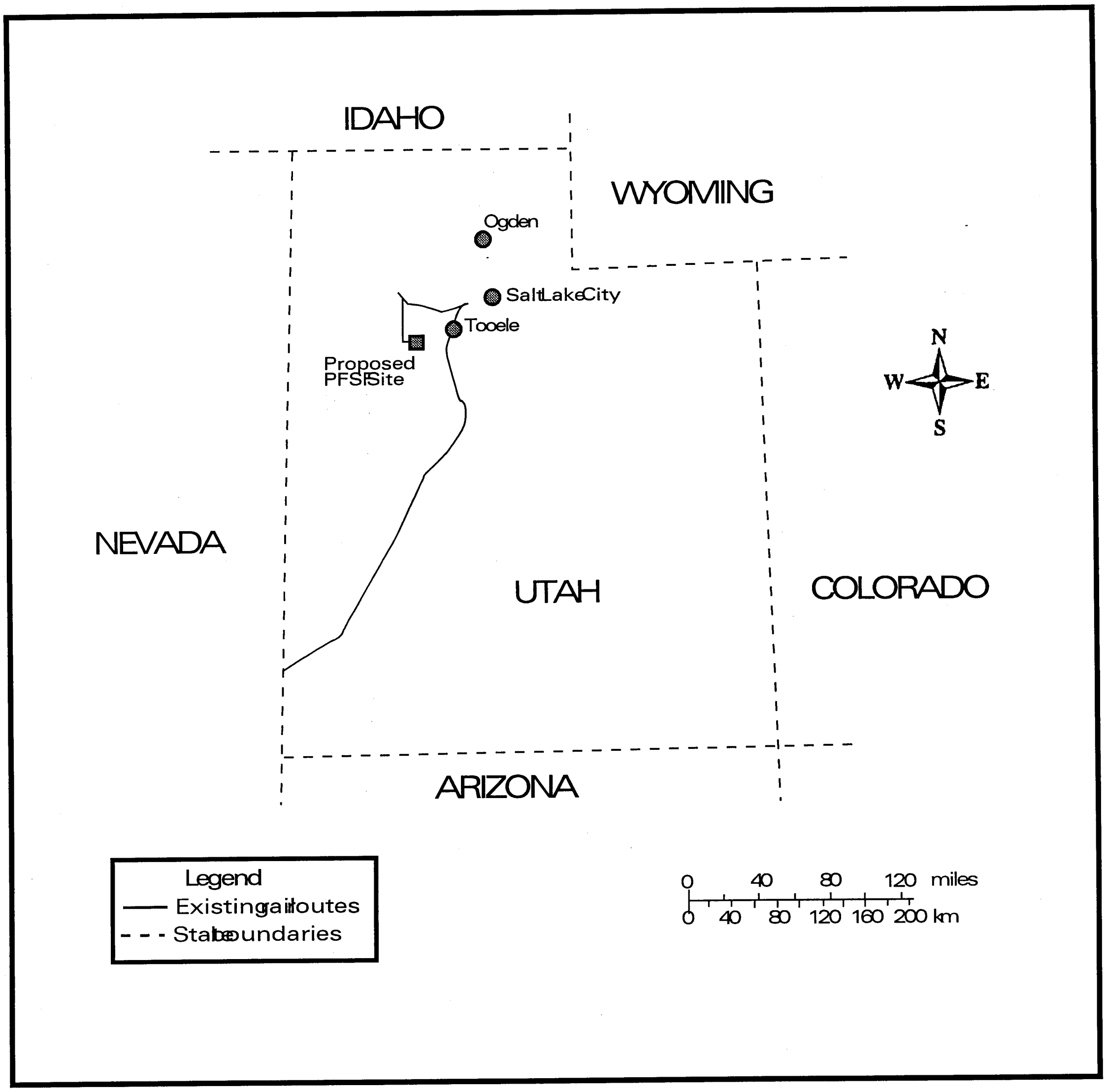

Figure C.2. Rail route for shipping SNF from Skull Valley, Utah, toward a national repository.

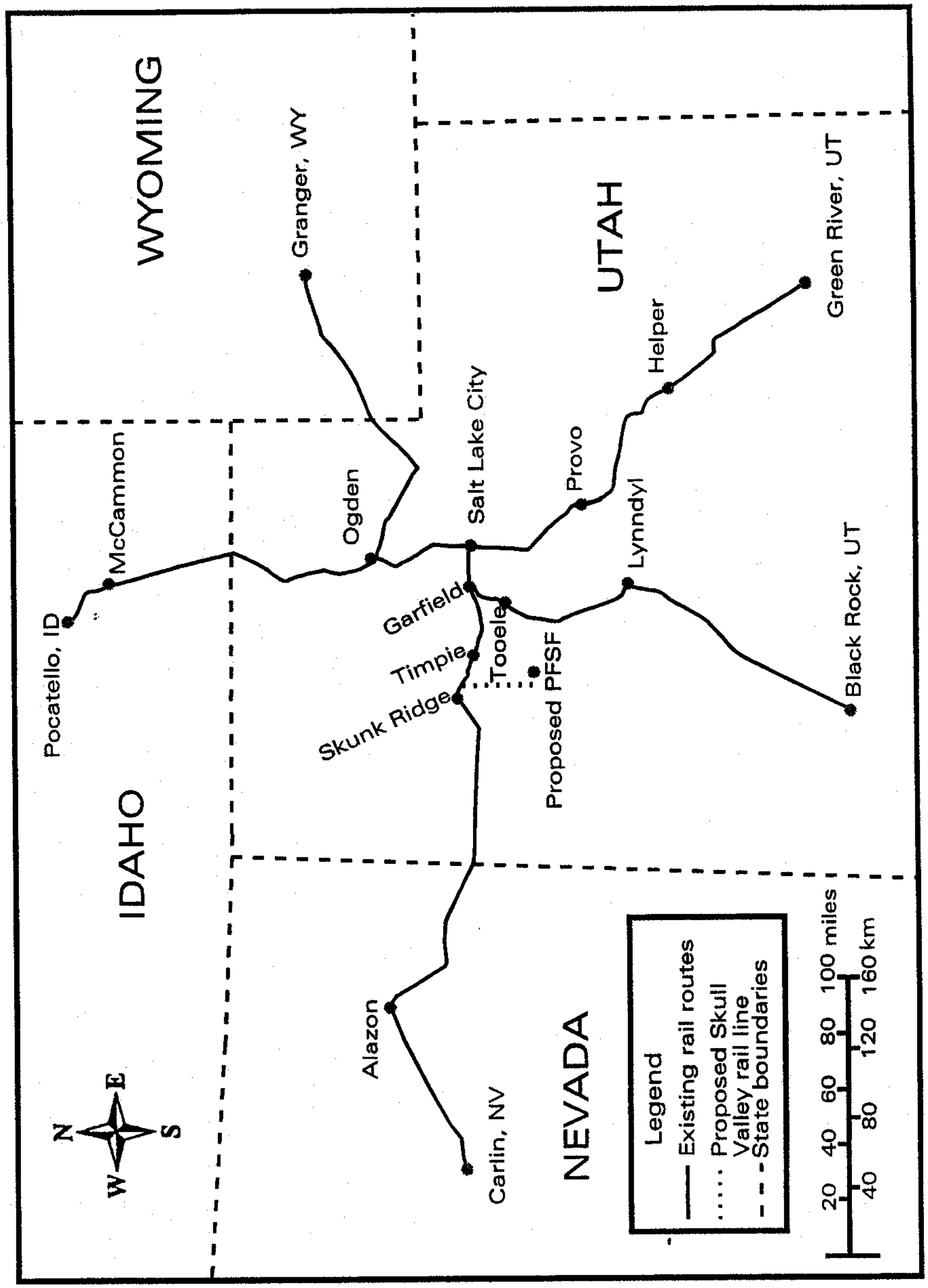

Figure C.3. Potential rail routes for shipping spent nuclear fuel to Skull Valley, Utah.

C.3.1 Route to Skull Valley from Granger, Wyoming

Due the number of nuclear utilities in the eastern United States, most SNF shipments will approach the proposed Skull Valley site via the route through Granger, Wyoming (see Figure C.3). This route follows the Union Pacific Railroad from Wyoming into northern Utah, passing through the larger cities of Ogden and Salt Lake City. From Salt Lake City, the route continues west through Garfield to a location called Skunk Ridge, where a new siding and new rail line would be constructed to reach the proposed PFSF site. The total length of this route from Granger is 357 km (222 miles). From Granger through Garfield, the Union Pacific is a dual-track mainline with a traffic density of over 40 MGTM annually. Most of the line between Granger and Ogden has ABS signals and the remainder of the route to Skunk Ridge has CTC signals. West of Garfield to the Skunk Ridge location, the Union Pacific is a single track mainline with a traffic density of 30 to 40 MGTM annually.

C.3.2 Route to Skull Valley from Green River, Utah

Reactor locations in Louisiana and Texas could use the route through Green River, Utah, to access the proposed site in Skull Valley. This route represents the second smallest potential number of shipments of SNF. This route has a total length of 380 km (236 miles) and extends from Green River through Provo to Salt Lake City. West of Salt Lake City, the route follows the same path described above to Skunk Ridge, where it would connect with the new rail line to the proposed facility. The entire route from Green River to Skunk Ridge is CTC signaled territory owned by the Union Pacific railroad. The number of tracks varies over this route. Single track exists from Green River to Helper (approximately midway between Green River and Provo), from Provo to Salt Lake City, and from Garfield to Skunk Ridge. Two main tracks exist between Helper and Provo and from Salt Lake City to Garfield.

C.3.3 Route to Skull Valley from Black Rock, Utah

Reactors in Arizona and southern California could access the Skull Valley site from Black Rock, Utah. This route has a length of 330 km (205 miles) and is entirely owned by the Union Pacific railroad. The route extends from Black Rock to Garfield, then west to Skunk Ridge, where it would connect with the new rail line to the proposed facility. This entire route is single track with CTC signaling. The first 114 km (71 miles) of the route between Black Rock and Lynndyl has traffic density over 40 MGTM. The remainder of the route from Lynndyl to Skunk Ridge has a traffic density between 30 and 40 MGTM. This route is also assumed to be used to ship SNF away from Skunk Ridge toward a national repository, although other routes could do so as well, depending on where a final repository is ultimately located.

C.3.4 Route to Skull Valley from Carlin, Nevada

The route through Carlin, Nevada, could be used to ship SNF from reactors located in northern California to the Skull Valley site. The length of this route between Carlin and the proposed ISFSI is 385 km (239 miles) and is entirely owned by the Union Pacific railroad. The entire route from Carlin to Skunk Ridge is single track and has a traffic density between 30 and 40 MGTM. From Carlin to Alazon, the line has ABS signals. The remainder of the route, between Alazon to Skunk Ridge, has CTC signals.

C.3.5 Route to Skull Valley from Pocatello, Idaho

The fifth and final access route to north-central Utah extends from Pocatello, Idaho, through Ogden and Salt Lake City to the proposed Skull Valley site. Reactors located in Oregon and Washington could use this route, which is 346 km (215 miles) long. Track characteristics vary for this route. Between Pocatello and McCammon, Idaho, the trackage is CTC signaled dual track with a traffic density over 40 MGTM. From McCammon to Ogden, Utah, the trackage is single track with ABS signals and a traffic density between 10 and 20 MGTM. Between Ogden and Garfield the trackage is CTC dual track with a traffic density over 40 MGTM. The final mainline segment of this route, between Garfield and Skunk Ridge is CTC single track with a traffic density between 30 and 40 MGTM.

C.4 Routes Near the Wyoming Site

An alternative site for the proposed facility in Fremont County, Wyoming, between the towns of Shoshoni and Bonneville, is also examined in this EIS. This site is located approximately 3 km (2 miles) from the Burlington Northern Santa Fe (BNSF) Railway mainline that runs through central Wyoming.

The INTERLINE rail routing model was used to examine possible rail access routes to the Wyoming site. As with the access routes identified for the Utah site, the actual distances of the routes to the Wyoming site vary [from 350 km (220 miles) to 400 km (250 miles)] due to the structure of the INTERLINE rail routing network. Four different access routes could be used to service the alternative site in Wyoming. These rail routes are shown in Figure C.4.

C.4.1 Route to Fremont County from Crandall, Wyoming

The access route from Crandall, Wyoming, to the alternative site near Bonneville could be used by several commercial nuclear reactors in the Midwest that are served by the Union Pacific Railroad. This 350-km (220-mile) route would use the Union Pacific Railroad from Crandall to Shawnee Junction, Wyoming, where Union Pacific Railroad has trackage rights on the BNSF to Casper, Wyoming. At Casper, the traffic would be interchanged to the BNSF for the remainder of the route to Bonneville, Wyoming. Between Crandall and Shawnee Junction, the Union Pacific line alternates between singe and dual track sections, has CTC signaling, and has a traffic density of over 40 MGTM. From Shawnee Junction to Orin, the line is single track, has CTC signaling, and also has a traffic density over 40 MGTM. The final portion of this route from Orin to Bonneville is single track with no signaling and has a traffic density between 10 and 20 MGTM.

C.4.2 Route to Fremont County from Mitchell, Nebraska

Shipments of SNF from most commercial nuclear reactors in the eastern United States would access the alternative site near Bonneville via the route through Mitchell, Nebraska. This route follows the BNSF from Mitchell, near the Nebraska-Wyoming border to Bonneville, Wyoming, and is 400 km (250 miles) long. From Mitchell to Orin, Wyoming, the rail line is single track with CTC signals and has a traffic density over 40 MGTM. Between Orin and Bonneville, the line is single track with no signaling and has a traffic density between 10 and 20 MGTM.

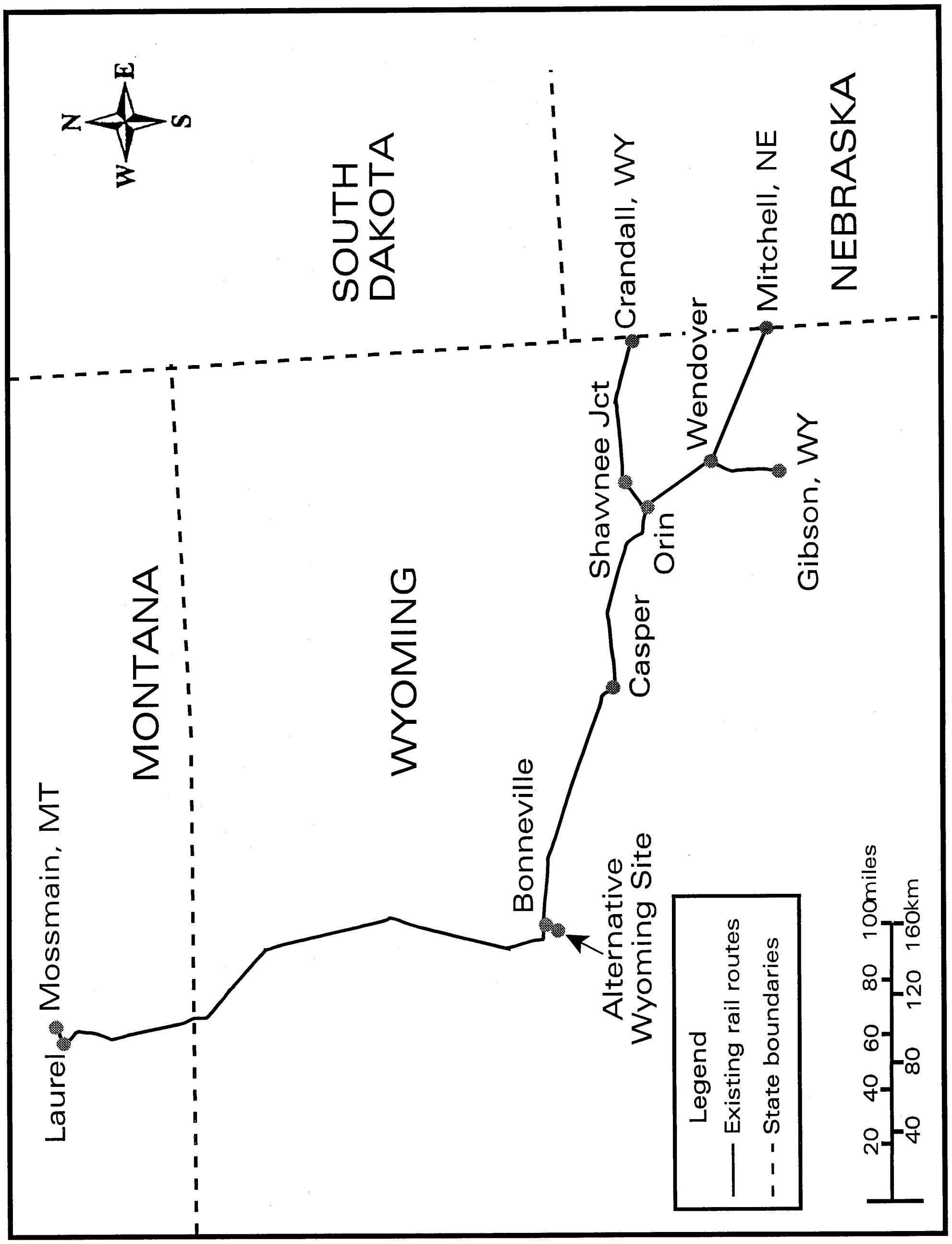

Figure C.4. Potential rail routes for shipping spent nuclear fuel to Fremont County, Wyoming.

C.4.3 Route to Fremont County from Gibson, Wyoming

SNF from southwestern states, including California through Texas, could use the Gibson, Wyoming, access route. This 370-km (230-mile) route follows the BNSF Railway from Gibson to Bonneville. From Gibson to Wendover, Wyoming, and from Orin to Bonneville, the rail line is single track with no signals and has a traffic density between 10 and 20 MGTM. The portion of the route between Wendover and Orin is single track with CTC signals and has a traffic density of over 40 MGTM.

C.4.4 Route to Fremont County from Mossmain, Montana

The fourth and final access route to the alternative site near Bonneville is from Mossmain, Montana, to Bonneville. This route could be used by commercial nuclear reactors located in the Pacific Northwest, as well as one of the reactors in Minnesota. BNSF would transport the shipment over this 365-km (227-mile) route. From Mossmain to Laurel, Montana, the route in on single track, ABS signaled line owned by the Montana Rail Link company. This segment has a traffic density between 20 and 30 MGTM. The remainder of the route from Laurel to Bonneville is on BNSF-owned line that is single track with no signaling and has a traffic density between 10 and 20 MGTM.

C.5 Interline Output for Routes Near the Skull Valley, Utah, Site

C.5.1 Route Between Granger, Wyoming and the Utah PFSF Site

```
   ROUTE FROM:  UP   13494-GRANGER             WY     LENGTH:   275.7 MILES
           TO:  UP   16153-PFSF                UT  POTENTIAL:  297.36


  MILEAGE SUMMARY BY RAILROAD          A-M   B-M   A-BR  B-BR  OTHER
                      UP    275.7    243.7    .0    .0  32.0     .0
                           - - -  - - -  - -  - -  - - -  - -
                    TOTAL   275.7    243.7    .0    .0  32.0     .0
   MILEAGE SUMMARY BY STATE
           206.1-UT     69.6-WY


     RR      NODE            STATE  DIST
    UP   13494-GRANGER         WY     0.
    UP   13568-OGDEN           UT   143.
    UP   13595-SALT LAKE CITY  UT   179.
    UP   13594-GARFIELD        UT   191.
    UP   16153-PFSF            UT   276.

   POPULATION DENSITY FROM:  UP   13494-GRANGER             WY
                       TO:  UP   16153-PFSF                UT

         ------------------  MILEAGE WITHIN DENSITY LEVELS  -------------------
               <0.0   5.0  22.7  59.7   139   326   821  1861  3326  5815
St Miles    0  -5.0 -22.7 -59.7  -139  -326  -821 -1861 -3326 -5815 -9996 >9996
-------------------------------------------------------------------------------

UT 206.1 67.5  76.3  26.7   2.9   2.4   2.7   4.8   7.0   7.2   6.4   2.0    .2
WY  69.6 20.6  48.5    .5    .0    .0    .0    .0    .0    .0    .0    .0    .0

Totals
   275.7 88.1 124.8  27.2   2.9   2.4   2.7   4.8   7.0   7.2   6.4   2.0    .2
Percentages
         31.9  45.3   9.9   1.1    .9   1.0   1.7   2.6   2.6   2.3    .7    .1
Basis: 1990 Census data

   RADTRAN Input Data      Rural Suburban    Urban

   Weighted Population
        People/sq. mi.       4.3   1448.1   5461.4
        People/sq. km.       1.6    559.1   2108.6

   Distance                                         Total
        Miles              245.4     21.7      8.6   275.7
        Kilometers         395.0     34.9     13.9   443.7
        Percentage          89.0      7.9      3.1

   Basis (people/sq. mi.)   <139 139-3326    >3326

   Note: Due to rounding, the sum of the mileages in the individual
         population categories may not equal the total mileage shown
         on this report.
```

C.5.2 Route Between Green River, Utah and the Utah PFSF Site

ROUTE FROM: UP 13635-GREEN RIVER UT LENGTH: 290.3 MILES
TO: UP 16153-PFSF UT POTENTIAL: 309.04

MILEAGE SUMMARY BY RAILROAD

		A-M	B-M	A-BR	B-BR	OTHER
UP	290.3	258.3	.0	.0	32.0	.0
TOTAL	290.3	258.3	.0	.0	32.0	.0

MILEAGE SUMMARY BY STATE
290.3-UT

RR	NODE	STATE	DIST
UP	13635-GREEN RIVER	UT	0.
UP	13613-THISTLE	UT	130.
UP	13611-SPRINGVILLE	UT	144.
UP	13610-PROVO	UT	149.
UP	13609-GENEVA	UT	156.
UP	13593-PALLAS	UT	186.
UP	13595-SALT LAKE CITY	UT	193.
UP	13594-GARFIELD	UT	205.
UP	16153-PFSF	UT	290.

POPULATION DENSITY FROM: UP 13635-GREEN RIVER UT
TO: UP 16153-PFSF UT

------------------ MILEAGE WITHIN DENSITY LEVELS -------------------

St	Miles	0	<0.0 -5.0	5.0 -22.7	22.7 -59.7	59.7 -139	139 -326	326 -821	821 -1861	1861 -3326	3326 -5815	5815 -9996	>9996
UT	290.3	117.8	101.6	15.3	8.1	7.8	7.0	8.9	13.2	5.9	3.8	.9	.1
Totals	290.3	117.8	101.6	15.3	8.1	7.8	7.0	8.9	13.2	5.9	3.8	.9	.1
Percentages		40.6	35.0	5.3	2.8	2.7	2.4	3.1	4.5	2.0	1.3	.3	.0

Basis: 1990 Census data

RADTRAN Input Data	Rural	Suburban	Urban	Total
Weighted Population				
People/sq. mi.	6.3	1135.0	5304.1	
People/sq. km.	2.4	438.2	2047.9	
Distance				
Miles	250.5	35.0	4.8	290.3
Kilometers	403.1	56.3	7.8	467.2
Percentage	86.3	12.1	1.7	
Basis (people/sq. mi.)	<139	139-3326	>3326	

Note: Due to rounding, the sum of the mileages in the individual population categories may not equal the total mileage shown on this report.

C.5.3 Route Between Black Rock, Utah and the Utah PFSF Site

```
   ROUTE FROM:  UP   13619-BLACK ROCK          UT     LENGTH:   259.0 MILES
          TO:  UP   16153-PFSF                UT  POTENTIAL:  284.00


  MILEAGE SUMMARY BY RAILROAD          A-M   B-M   A-BR  B-BR  OTHER
                    UP    259.0    227.0    .0    .0  32.0     .0
                           -  -  -  -  -  -  -  -  -  -  -  -  -  -
                  TOTAL   259.0    227.0    .0    .0  32.0     .0
   MILEAGE SUMMARY BY STATE
           259.0-UT


     RR      NODE            STATE  DIST
    UP   13619-BLACK ROCK      UT     0.
    UP   13630-LYNNDYL         UT    71.
    UP   13594-GARFIELD        UT   174.
    UP   16153-PFSF            UT   259.


   POPULATION DENSITY FROM:  UP   13619-BLACK ROCK          UT
                       TO:  UP   16153-PFSF                UT

         ------------------  MILEAGE WITHIN DENSITY LEVELS  -------------------
               <0.0   5.0  22.7  59.7   139   326   821  1861  3326  5815
St Miles    0  -5.0 -22.7 -59.7  -139  -326  -821 -1861 -3326 -5815 -9996 >9996
--------------------------------------------------------------------------------

UT 259.0100.8 120.5  27.5   4.6   2.2    .9    .7   1.4    .5    .0    .0    .0

Totals
   259.0100.8 120.5  27.5   4.6   2.2    .9    .7   1.4    .5    .0    .0    .0
Percentages
         38.9  46.5  10.6   1.8    .9    .3    .3    .5    .2    .0    .0    .0
Basis: 1990 Census data

   RADTRAN Input Data      Rural Suburban    Urban

   Weighted Population
        People/sq. mi.       4.3   1076.3       .0
        People/sq. km.       1.6    415.5       .0

   Distance                                         Total
        Miles              255.5      3.5       .0   259.0
        Kilometers         411.3      5.6       .0   416.8
        Percentage          98.7      1.3       .0

   Basis (people/sq. mi.)   <139 139-3326    >3326

   Note: Due to rounding, the sum of the mileages in the individual
         population categories may not equal the total mileage shown
         on this report.
```

C.5.4 Route Between Carlin, Nevada, and the Utah PFSF Site

ROUTE FROM:	UP	14792-CARLIN	NV	LENGTH:	248.0 MILES
TO:	UP	16153-PFSF	UT	POTENTIAL:	275.20

MILEAGE SUMMARY BY RAILROAD

		A-M	B-M	A-BR	B-BR	OTHER
UP	248.0	216.0	.0	.0	32.0	.0
TOTAL	248.0	216.0	.0	.0	32.0	.0

MILEAGE SUMMARY BY STATE

162.0-NV   86.0-UT

RR	NODE	STATE	DIST
UP	14792-CARLIN	NV	0.
UP	14793-ELKO	NV	20.
UP	14794-ALAZON	NV	71.
UP	14795-WELLS	NV	75.
UP	14797-SHAFTER	NV	121.
UP	16153-PFSF	UT	248.

POPULATION DENSITY FROM:	UP	14792-CARLIN	NV
TO:	UP	16153-PFSF	UT

MILEAGE WITHIN DENSITY LEVELS

St	Miles	0	<0.0 -5.0	5.0 -22.7	22.7 -59.7	59.7 -139	139 -326	326 -821	821 -1861	1861 -3326	3326 -5815	5815 -9996	>9996
NV	162.0	21.9	109.1	16.6	6.6	4.8	1.3	1.2	.5	.0	.0	.0	.0
UT	86.0	81.7	3.1	1.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
Totals	248.0	103.7	112.1	17.8	6.6	4.8	1.3	1.2	.5	.0	.0	.0	.0
Percentages		41.8	45.2	7.2	2.7	2.0	.5	.5	.2	.0	.0	.0	.0

Basis: 1990 Census data

RADTRAN Input Data	Rural	Suburban	Urban	Total
Weighted Population				
People/sq. mi.	5.2	553.6	.0	
People/sq. km.	2.0	213.7	.0	
Distance				
Miles	245.1	2.9	.0	248.0
Kilometers	394.4	4.7	.0	399.1
Percentage	98.8	1.2	.0	
Basis (people/sq. mi.)	<139	139-3326	>3326	

Note: Due to rounding, the sum of the mileages in the individual population categories may not equal the total mileage shown on this report.

C.5.5 Route Between Pocatello, Idaho, and the Utah PFSF Site

```
ROUTE FROM:  UP   13370-POCATELLO          ID     LENGTH:   269.1 MILES
       TO:  UP   16153-PFSF               UT  POTENTIAL:  310.24
```

MILEAGE SUMMARY BY RAILROAD		A-M	B-M	A-BR	B-BR	OTHER
UP	269.1	123.6	113.5	.0	32.0	.0
TOTAL	269.1	123.6	113.5	.0	32.0	.0

MILEAGE SUMMARY BY STATE
72.0-ID   197.1-UT

RR	NODE	STATE	DIST
UP	13370-POCATELLO	ID	0.
UP	13369-MC CAMMON	ID	23.
UP	13568-OGDEN	UT	137.
UP	13595-SALT LAKE CITY	UT	172.
UP	13594-GARFIELD	UT	184.
UP	16153-PFSF	UT	269.

```
POPULATION DENSITY FROM:  UP   13370-POCATELLO           ID
                     TO:  UP   16153-PFSF                UT
```

MILEAGE WITHIN DENSITY LEVELS

St	Miles	0	<0.0 -5.0	5.0 -22.7	22.7 -59.7	59.7 -139	139 -326	326 -821	821 -1861	1861 -3326	3326 -5815	5815 -9996	>9996
ID	72.0	4.5	13.4	42.2	8.7	1.3	.8	.3	.7	.0	.0	.0	.0
UT	197.1	80.8	40.9	14.4	16.4	9.1	7.3	7.2	7.4	6.5	5.6	1.5	.0
Totals	269.1	85.3	54.3	56.6	25.1	10.5	8.0	7.5	8.1	6.5	5.6	1.5	.0
Percentages		31.7	20.2	21.0	9.3	3.9	3.0	2.8	3.0	2.4	2.1	.5	.0

Basis: 1990 Census data

RADTRAN Input Data	Rural	Suburban	Urban	Total
Weighted Population				
People/sq. mi.	12.9	1124.7	5270.8	
People/sq. km.	5.0	434.2	2035.0	
Distance				
Miles	231.9	30.1	7.1	269.1
Kilometers	373.1	48.5	11.4	433.1
Percentage	86.2	11.2	2.6	
Basis (people/sq. mi.)	<139	139-3326	>3326	

Note: Due to rounding, the sum of the mileages in the individual population categories may not equal the total mileage shown on this report.

C.6 Interline Output for Routes Near the Fremont County, Wyoming, Site

C.6.1 Route Between Crandall, Wyoming, and the Alternative PFSF Site

```
   ROUTE FROM:  UP   11264-CRANDALL            WY     LENGTH:   219.9 MILES
           TO:  BNSF 13499-BONNEVILLE          WY  POTENTIAL:  544.22

  MILEAGE SUMMARY BY RAILROAD          A-M   B-M   A-BR  B-BR  OTHER
                      BNSF  100.0       .0 100.0    .0    .0     .0
                      UP    119.9     48.0  64.4    .0   7.5     .0
                           -  -  -  -  -  -  -  -  -  -  -  -  -  -
                    TOTAL   219.9     48.0 164.4    .0   7.5     .0
   MILEAGE SUMMARY BY STATE
           219.9-WY

     RR      NODE            STATE  DIST
    UP   11264-CRANDALL        WY     0.
    UP   13474-CASPER          WY   120.
   - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
    BNSF 13474-CASPER          WY   120.
    BNSF 13499-BONNEVILLE      WY   220.


   POPULATION DENSITY FROM:  UP   11264-CRANDALL            WY
                       TO:  BNSF 13499-BONNEVILLE          WY

         ------------------  MILEAGE WITHIN DENSITY LEVELS  -------------------
               <0.0   5.0  22.7  59.7   139   326   821  1861  3326  5815
St Miles    0  -5.0 -22.7 -59.7  -139  -326  -821 -1861 -3326 -5815 -9996 >9996
-------------------------------------------------------------------------------

WY 219.9 31.9 153.8  16.4   4.4   1.2   3.1   4.3   1.4    .7   1.2   1.3    .2

Totals
   219.9 31.9 153.8  16.4   4.4   1.2   3.1   4.3   1.4    .7   1.2   1.3    .2
Percentages
         14.5  70.0   7.5   2.0    .5   1.4   2.0    .7    .3    .5    .6    .1
Basis: 1990 Census data

   RADTRAN Input Data      Rural Suburban    Urban

   Weighted Population
        People/sq. mi.       4.4    719.2   6584.6
        People/sq. km.       1.7    277.7   2542.3

   Distance                                          Total
        Miles              207.7      9.5      2.6    219.9
        Kilometers         334.3     15.3      4.3    353.9
        Percentage          94.5      4.3      1.2

   Basis (people/sq. mi.)   <139 139-3326    >3326

   Note: Due to rounding, the sum of the mileages in the individual
         population categories may not equal the total mileage shown
         on this report.
```

C.6.2 Route Between Mitchell, Nebraska, and the Alternative PFSF Site

ROUTE FROM:	BNSF 11265-MITCHELL	NE	LENGTH:	250.4 MILES
TO:	BNSF 13499-BONNEVILLE	WY	POTENTIAL:	226.62

MILEAGE SUMMARY BY RAILROAD		A-M	B-M	A-BR	B-BR	OTHER
BNSF	250.4	86.0	164.4	.0	.0	.0
TOTAL	250.4	86.0	164.4	.0	.0	.0

MILEAGE SUMMARY BY STATE
250.4-WY

RR	NODE	STATE	DIST
BNSF	11265-MITCHELL	NE	0.
BNSF	13470-GUERNSEY	WY	41.
BNSF	13474-CASPER	WY	150.
BNSF	13499-BONNEVILLE	WY	250.

POPULATION DENSITY FROM:	BNSF 11265-MITCHELL	NE
TO:	BNSF 13499-BONNEVILLE	WY

		MILEAGE WITHIN DENSITY LEVELS											
St	Miles	0	<0.0 -5.0	5.0 -22.7	22.7 -59.7	59.7 -139	139 -326	326 -821	821 -1861	1861 -3326	3326 -5815	5815 -9996	>9996
WY	250.4	41.1	163.6	21.9	6.4	3.5	4.7	4.3	1.4	.7	1.2	1.3	.2
Totals													
	250.4	41.1	163.6	21.9	6.4	3.5	4.7	4.3	1.4	.7	1.2	1.3	.2
Percentages													
		16.4	65.3	8.8	2.6	1.4	1.9	1.7	.6	.3	.5	.5	.1

Basis: 1990 Census data

RADTRAN Input Data	Rural	Suburban	Urban	
Weighted Population				
People/sq. mi.	5.6	650.1	6584.6	
People/sq. km.	2.2	251.0	2542.3	
Distance				Total
Miles	236.6	11.1	2.6	250.4
Kilometers	380.8	17.9	4.3	403.0
Percentage	94.5	4.4	1.1	
Basis (people/sq. mi.)	<139	139-3326	>3326	

Note: Due to rounding, the sum of the mileages in the individual population categories may not equal the total mileage shown on this report.

C.6.3 Route Between Gibson, Wyoming, and the Alternative PFSF Site

```
    ROUTE FROM:  BNSF 13468-GIBSON              WY     LENGTH:   230.4 MILES
            TO:  BNSF 13499-BONNEVILLE          WY  POTENTIAL:  215.26


   MILEAGE SUMMARY BY RAILROAD           A-M   B-M   A-BR  B-BR  OTHER
                        BNSF  230.4     37.0 193.4    .0    .0     .0
                              -  -  -  -  -  -  -  -  -  -  -  -  -  -
                      TOTAL   230.4     37.0 193.4    .0    .0     .0
    MILEAGE SUMMARY BY STATE
            230.4-WY


      RR      NODE            STATE  DIST
     BNSF 13468-GIBSON          WY     0.
     BNSF 13474-CASPER          WY   130.
     BNSF 13499-BONNEVILLE      WY   230.



    POPULATION DENSITY FROM:  BNSF 13468-GIBSON             WY
                         TO:  BNSF 13499-BONNEVILLE         WY

          ------------------  MILEAGE WITHIN DENSITY LEVELS  -------------------
                <0.0   5.0  22.7  59.7   139   326   821  1861  3326  5815
 St Miles    0  -5.0 -22.7 -59.7  -139  -326  -821 -1861 -3326 -5815 -9996 >9996
 ------------------------------------------------------------------------------

 WY 230.4 32.4 148.4  26.9   7.8   2.4   3.5   4.3   1.4    .7   1.2   1.3    .2

 Totals
    230.4 32.4 148.4  26.9   7.8   2.4   3.5   4.3   1.4    .7   1.2   1.3    .2
 Percentages
          14.0  64.4  11.7   3.4   1.0   1.5   1.9    .6    .3    .5    .6    .1
 Basis: 1990 Census data

    RADTRAN Input Data      Rural Suburban    Urban

    Weighted Population
         People/sq. mi.       6.0    701.4   6584.6
         People/sq. km.       2.3    270.8   2542.3

    Distance                                          Total
         Miles              217.9      9.9      2.6   230.4
         Kilometers         350.6     15.9      4.3   370.8
         Percentage          94.6      4.3      1.1

    Basis (people/sq. mi.)   <139 139-3326    >3326

    Note: Due to rounding, the sum of the mileages in the individual
          population categories may not equal the total mileage shown
          on this report.
```

C.6.4 Route Between Mossmain, Montana, and the Alternative PFSF Site

ROUTE FROM:	BNSF 13210-MOSSMAIN	MT	LENGTH:	226.9 MILES
TO:	BNSF 13499-BONNEVILLE	WY	POTENTIAL:	217.82

MILEAGE SUMMARY BY RAILROAD			A-M	B-M	A-BR	B-BR	OTHER
	BNSF	226.9	.0	226.9	.0	.0	.0
	TOTAL	226.9	.0	226.9	.0	.0	.0

MILEAGE SUMMARY BY STATE
56.0-MT 170.9-WY

RR	NODE	STATE	DIST
BNSF	13210-MOSSMAIN	MT	0.
BNSF	13211-LAUREL	MT	4.
BNSF	13499-BONNEVILLE	WY	227.

POPULATION DENSITY FROM: BNSF 13210-MOSSMAIN MT
TO: BNSF 13499-BONNEVILLE WY

St	Miles	0	<0.0 -5.0	5.0 -22.7	22.7 -59.7	59.7 -139	139 -326	326 -821	821 -1861	1861 -3326	3326 -5815	5815 -9996	>9996
			MILEAGE WITHIN DENSITY LEVELS										
MT	56.0	.0	37.0	9.2	7.1	1.3	.5	.2	.6	.0	.0	.0	.0
WY	170.9	21.1	106.4	32.8	6.6	2.0	.3	.2	.5	.4	.6	.0	.0
Totals	226.9	21.1	143.4	42.0	13.7	3.3	.8	.5	1.1	.4	.6	.0	.0
Percentages		9.3	63.2	18.5	6.0	1.4	.3	.2	.5	.2	.3	.0	.0

Basis: 1990 Census data

RADTRAN Input Data	Rural	Suburban	Urban	
Weighted Population				
People/sq. mi.	8.2	1096.1	4570.5	
People/sq. km.	3.2	423.2	1764.7	
Distance				Total
Miles	223.5	2.8	.6	226.9
Kilometers	359.7	4.4	1.0	365.2
Percentage	98.5	1.2	.3	
Basis (people/sq. mi.)	<139	139-3326	>3326	

Note: Due to rounding, the sum of the mileages in the individual population categories may not equal the total mileage shown on this report.

C.7 Interline Output for the Route Between the Maine Yankee Nuclear Plant (in Maine) and Skull Valley, Utah

```
INTERLINE 5.10  NETWORK 14.00

ROUTE FROM:  <C3>    96-MAINE YANKEE NP     ME     LENGTH:  2781.3 MILES
        TO:  UP   16153-PFSF                UT  POTENTIAL:  3778.4


MILEAGE SUMMARY BY RAILROAD           A-M   B-M   A-BR  B-BR  OTHER
                      CPRS  352.7    209.8 142.9    .0    .0     .0
                      NS    528.9    521.9   7.0    .0    .0     .0
                      UP   1575.7   1531.9  11.8    .0  32.0     .0
                      ST    293.0       .0 278.0    .0  15.0     .0
                      <C3>   31.0       .0    .0    .0  31.0     .0
                           - - - - - - - - - - - - - - - - - - -
                    TOTAL  2781.3   2263.6 439.7    .0  78.0     .0
 MILEAGE SUMMARY BY STATE
          10.0-CO    150.9-IL    148.4-IN    336.2-IA    100.9-ME
         151.0-MA    451.5-NE     31.4-NH    460.4-NY    245.9-OH
          44.0-PA    206.1-UT      6.0-VT    438.6-WY



   RR      NODE            STATE  DIST
  <C3>    96-MAINE YANKEE NP ME     0.
  <C3>   121-BRUNSWICK       ME    31.
 - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
  ST     121-BRUNSWICK       ME    31.
  ST     135-YARMOUTH JCT    ME    45.
  ST     132-PORTLAND        ME    61.
  ST     142-DOVER           NH   112.
  ST     291-LAWRENCE        MA   147.
  ST     299-LOWELL          MA   160.
  ST     423-AYER            MA   177.
  ST     432-FITCHBURG       MA   190.
  ST     447-MILLERS FALLS   MA   237.
  ST     454-GREENFIELD      MA   243.
  ST     694-MECHANICVILLE   NY   324.
 - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
  CPRS   694-MECHANICVILLE   NY   324.
  CPRS   706-SCHENECTADY     NY   337.
  CPRS  1037-BINGHAMTON      NY   467.
  CPRS  1039-WAVERLY         NY   507.
  CPRS  1008-ELMIRA          NY   525.
  CPRS  1009-CORNING         NY   543.
  CPRS   881-NIAGARA JCT     NY   665.
  CPRS   880-BUFFALO         NY   677.
 - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
  NS     880-BUFFALO         NY   677.
  NS     938-DUNKIRK         NY   718.
  NS     942-WESTFIELD       NY   742.
  NS     968-ERIE            PA   771.
  NS    2652-CONNEAUT        OH   795.
  NS    2649-ASHTABULA       OH   809.
  NS    2727-PAINESVILLE     OH   835.
  NS    2728-CLEVELAND       OH   865.
  NS    2633-ELYRIA          OH   892.
  NS   14985-OAK HARBOR      OH   949.
  NS    3442-TOLEDO          OH   971.
  NS    3526-GOSHEN          IN  1093.
  NS    3525-ELKHART         IN  1103.
  NS    4022-SOUTH BEND      IN  1118.
  NS    3969-LA PORTE        IN  1144.
```

NS	4067-PORTER	IN	1163.
NS	4069-MILLER	IN	1173.
NS	4070-GARY	IN	1178.
NS	4073-CLARKE	IN	1182.
NS	4074-INDIANA HARBOR	IN	1185.
NS	4035-WHITING LAKE FRO	IN	1188.
NS	4232-SOUTH CHICAGO	IL	1193.
NS	4217-CHICAGO	IL	1206.
- TRANSFER			
UP	4217-CHICAGO	IL	1206.
UP	4234-PROVISO	IL	1220.
UP	4214-WEST CHICAGO	IL	1235.
UP	4311-DE KALB	IL	1262.
UP	4324-NELSON	IL	1307.
UP	10304-CLINTON	IA	1342.
UP	10289-CEDAR RAPIDS	IA	1423.
UP	10265-MARSHALLTOWN	IA	1492.
UP	10246-NEVADA	IA	1519.
UP	10271-AMES	IA	1530.
UP	10177-ARION	IA	1628.
UP	10176-MISSOURI VALLEY	IA	1664.
UP	10198-CALIFORNIA JCT	IA	1670.
UP	11340-FREMONT	NE	1698.
UP	11473-CENTRAL CITY	NE	1785.
UP	11406-GRAND ISLAND	NE	1807.
UP	11410-GIBBON	NE	1833.
UP	11352-NORTH PLATTE	NE	1952.
UP	11358-O FALLONS	NE	1964.
UP	13703-JULESBURG	CO	2032.
UP	11287-SIDNEY	NE	2075.
UP	13465-CHEYENNE	WY	2178.
UP	13462-LARAMIE	WY	2230.
UP	13494-GRANGER	WY	2506.
UP	13568-OGDEN	UT	2649.
UP	13595-SALT LAKE CITY	UT	2684.
UP	13594-GARFIELD	UT	2696.
UP	16153-PFSF	UT	2781.

POPULATION DENSITY FROM: <C3> 96-MAINE YANKEE NP ME
TO: UP 16153-PFSF UT

MILEAGE WITHIN DENSITY LEVELS

St	Miles	0	<0.0 -5.0	5.0 -22.7	22.7 -59.7	59.7 -139	139 -326	326 -821	821 -1861	1861 -3326	3326 -5815	5815 -9996	>9996
CO	10.0	.4	6.6	.3	.4	.5	.6	1.2	.0	.0	.0	.0	.0
IL	150.9	7.8	11.3	24.1	20.5	12.5	10.7	10.7	10.3	8.5	10.4	11.1	13.0
IN	148.4	8.7	24.7	13.3	25.5	13.9	13.7	14.6	12.8	10.7	6.8	3.0	.6
IA	336.2	15.7	79.0	83.3	67.2	29.7	20.6	12.1	8.6	9.4	6.3	3.1	1.4
ME	100.9	17.6	3.2	4.4	5.1	10.6	37.1	16.7	3.7	1.0	.3	.2	.9
MA	151.0	2.6	3.8	5.5	29.0	15.5	29.9	26.4	22.5	6.4	4.1	2.2	3.2
NE	451.5	58.4	191.9	111.4	37.8	19.7	11.1	7.0	6.5	4.7	2.3	.7	.0
NH	31.4	1.1	.2	.6	1.5	4.2	10.4	6.7	5.3	1.1	.4	.0	.0
NY	460.4	45.8	37.1	44.6	100.3	99.0	57.7	30.3	21.8	12.2	5.8	3.7	2.1
OH	245.9	27.3	5.5	9.1	23.5	32.4	37.7	36.5	33.3	18.1	13.8	7.3	1.5
PA	44.0	1.0	1.3	.3	1.8	9.3	13.3	4.8	4.4	2.2	3.6	1.7	.4
UT	206.1	67.5	76.3	26.7	2.9	2.4	2.7	4.8	7.0	7.2	6.4	2.0	.2
VT	6.0	.0	.0	.0	.0	6.0	.0	.0	.0	.0	.0	.0	.0
WY	438.6	112.5	276.3	18.0	18.0	3.8	2.0	2.8	2.2	1.3	1.2	.4	.0

Totals

2781.3366.4 717.3 341.8 333.5 259.5 247.3 174.5 138.4 82.6 61.3 35.3 23.3

Percentages

13.2 25.8 12.3 12.0 9.3 8.9 6.3 5.0 3.0 2.2 1.3 .8

Basis: 1990 Census data

RADTRAN Input Data	Rural	Suburban	Urban	
Weighted Population				
People/sq. mi.	22.8	867.1	6609.1	
People/sq. km.	8.8	334.8	2551.8	
Distance				Total
Miles	2018.4	642.8	120.0	2781.3
Kilometers	3248.2	1034.5	193.1	4475.9
Percentage	72.6	23.1	4.3	
Basis (people/sq. mi.)	<139	139-3326	>3326	

Note: Due to rounding, the sum of the mileages in the individual population categories may not equal the total mileage shown on this report.

C.8 Interline Output for the Route Between the Maine Yankee Nuclear Plant (in Maine) and Timpie, Utah

```
 INTERLINE 5.10  NETWORK 14.00

 ROUTE FROM:  <C3>    96-MAINE YANKEE NP     ME     LENGTH:  2727.3 MILES
        TO:  UP   13516-TIMPIE              UT  POTENTIAL:  3628.4


MILEAGE SUMMARY BY RAILROAD          A-M   B-M   A-BR  B-BR  OTHER
                      CPRS  352.7    209.8 142.9    .0    .0     .0
                      NS    528.9    521.9   7.0    .0    .0     .0
                      UP   1521.7   1509.9  11.8    .0    .0     .0
                      ST    293.0       .0 278.0    .0  15.0     .0
                      <C3>   31.0       .0    .0    .0  31.0     .0
                           -  -  -  -  -  -  -  -  -  -  -  -  -  -
                    TOTAL  2727.3   2241.6 439.7    .0  46.0     .0
 MILEAGE SUMMARY BY STATE
          10.0-CO    150.9-IL    148.4-IN    336.2-IA    100.9-ME
         151.0-MA    451.5-NE     31.4-NH    460.4-NY    245.9-OH
          44.0-PA    152.1-UT      6.0-VT    438.6-WY



   RR      NODE            STATE  DIST
  <C3>    96-MAINE YANKEE NP ME     0.
  <C3>   121-BRUNSWICK       ME    31.
 - - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
  ST     121-BRUNSWICK       ME    31.
  ST     135-YARMOUTH JCT    ME    45.
  ST     132-PORTLAND        ME    61.
  ST     142-DOVER           NH   112.
  ST     291-LAWRENCE        MA   147.
  ST     299-LOWELL          MA   160.
  ST     423-AYER            MA   177.
  ST     432-FITCHBURG       MA   190.
  ST     447-MILLERS FALLS   MA   237.
  ST     454-GREENFIELD      MA   243.
  ST     694-MECHANICVILLE   NY   324.
 - - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
  CPRS   694-MECHANICVILLE   NY   324.
  CPRS   706-SCHENECTADY     NY   337.
  CPRS  1037-BINGHAMTON      NY   467.
  CPRS  1039-WAVERLY         NY   507.
  CPRS  1008-ELMIRA          NY   525.
  CPRS  1009-CORNING         NY   543.
  CPRS   881-NIAGARA JCT     NY   665.
  CPRS   880-BUFFALO         NY   677.
 - - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
  NS     880-BUFFALO         NY   677.
  NS     938-DUNKIRK         NY   718.
  NS     942-WESTFIELD       NY   742.
  NS     968-ERIE            PA   771.
  NS    2652-CONNEAUT        OH   795.
  NS    2649-ASHTABULA       OH   809.
  NS    2727-PAINESVILLE     OH   835.
  NS    2728-CLEVELAND       OH   865.
  NS    2633-ELYRIA          OH   892.
  NS   14985-OAK HARBOR      OH   949.
  NS    3442-TOLEDO          OH   971.
  NS    3526-GOSHEN          IN  1093.
  NS    3525-ELKHART         IN  1103.
  NS    4022-SOUTH BEND      IN  1118.
  NS    3969-LA PORTE        IN  1144.
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    NS    4067-PORTER          IN  1163.
    NS    4069-MILLER          IN  1173.
    NS    4070-GARY            IN  1178.
    NS    4073-CLARKE          IN  1182.
    NS    4074-INDIANA HARBOR  IN  1185.
    NS    4035-WHITING LAKE FROIN  1188.
    NS    4232-SOUTH CHICAGO   IL  1193.
    NS    4217-CHICAGO         IL  1206.
   - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
    UP    4217-CHICAGO         IL  1206.
    UP    4234-PROVISO         IL  1220.
    UP    4214-WEST CHICAGO    IL  1235.
    UP    4311-DE KALB         IL  1262.
    UP    4324-NELSON          IL  1307.
    UP   10304-CLINTON         IA  1342.
    UP   10289-CEDAR RAPIDS    IA  1423.
    UP   10265-MARSHALLTOWN    IA  1492.
    UP   10246-NEVADA          IA  1519.
    UP   10271-AMES            IA  1530.
    UP   10177-ARION           IA  1628.
    UP   10176-MISSOURI VALLEY IA  1664.
    UP   10198-CALIFORNIA JCT  IA  1670.
    UP   11340-FREMONT         NE  1698.
    UP   11473-CENTRAL CITY    NE  1785.
    UP   11406-GRAND ISLAND    NE  1807.
    UP   11410-GIBBON          NE  1833.
    UP   11352-NORTH PLATTE    NE  1952.
    UP   11358-O FALLONS       NE  1964.
    UP   13703-JULESBURG       CO  2032.
    UP   11287-SIDNEY          NE  2075.
    UP   13465-CHEYENNE        WY  2178.
    UP   13462-LARAMIE         WY  2230.
    UP   13494-GRANGER         WY  2506.
    UP   13568-OGDEN           UT  2649.
    UP   13595-SALT LAKE CITY  UT  2684.
    UP   13594-GARFIELD        UT  2696.
    UP   13516-TIMPIE          UT  2727.


   POPULATION DENSITY FROM:  <C3>    96-MAINE YANKEE NP     ME
                        TO:  UP   13516-TIMPIE              UT
```

		------------------ MILEAGE WITHIN DENSITY LEVELS -------------------										
			<0.0	5.0	22.7	59.7	139	326	821	1861	3326	5815	
St	Miles	0	-5.0	-22.7	-59.7	-139	-326	-821	-1861	-3326	-5815	-9996	>9996
CO	10.0	.4	6.6	.3	.4	.5	.6	1.2	.0	.0	.0	.0	.0
IL	150.9	7.8	11.3	24.1	20.5	12.5	10.7	10.7	10.3	8.5	10.4	11.1	13.0
IN	148.4	8.7	24.7	13.3	25.5	13.9	13.7	14.6	12.8	10.7	6.8	3.0	.6
IA	336.2	15.7	79.0	83.3	67.2	29.7	20.6	12.1	8.6	9.4	6.3	3.1	1.4
ME	100.9	17.6	3.2	4.4	5.1	10.6	37.1	16.7	3.7	1.0	.3	.2	.9
MA	151.0	2.6	3.8	5.5	29.0	15.5	29.9	26.4	22.5	6.4	4.1	2.2	3.2
NE	451.5	58.4	191.9	111.4	37.8	19.7	11.1	7.0	6.5	4.7	2.3	.7	.0
NH	31.4	1.1	.2	.6	1.5	4.2	10.4	6.7	5.3	1.1	.4	.0	.0
NY	460.4	45.8	37.1	44.6	100.3	99.0	57.7	30.3	21.8	12.2	5.8	3.7	2.1
OH	245.9	27.3	5.5	9.1	23.5	32.4	37.7	36.5	33.3	18.1	13.8	7.3	1.5
PA	44.0	1.0	1.3	.3	1.8	9.3	13.3	4.8	4.4	2.2	3.6	1.7	.4
UT	152.1	13.5	76.3	26.7	2.9	2.4	2.7	4.8	7.0	7.2	6.4	2.0	.2
VT	6.0	.0	.0	.0	.0	6.0	.0	.0	.0	.0	.0	.0	.0
WY	438.6	112.5	276.3	18.0	18.0	3.8	2.0	2.8	2.2	1.3	1.2	.4	.0

Totals	2727.3	312.4	717.3	341.8	333.5	259.5	247.3	174.5	138.4	82.6	61.3	35.3	23.3
Percentages		11.5	26.3	12.5	12.2	9.5	9.1	6.4	5.1	3.0	2.2	1.3	.9

Basis: 1990 Census data

RADTRAN Input Data	Rural	Suburban	Urban	Total
Weighted Population				
People/sq. mi.	23.4	867.1	6609.1	
People/sq. km.	9.1	334.8	2551.8	
Distance				
Miles	1964.4	642.8	120.0	2727.3
Kilometers	3161.3	1034.5	193.1	4389.0
Percentage	72.0	23.6	4.4	
Basis (people/sq. mi.)	<139	139-3326	>3326	

Note: Due to rounding, the sum of the mileages in the individual population categories may not equal the total mileage shown on this report.

C.9 Interline Output for the Route Between Timpie, Utah, and the PFSF Site

```
                                            HIGHWAY  3.4                            Page    1
*********************************************************************************************

            TIMPIE            I80  X77  UT       to       PFSF                       UT

*********************************************************************************************

                     Leaving :  1/28/99 at  9:44 MST Arriving:  1/28/99 at 10:19 MST
                     Total Road Time:  0:35          Total Miles:   26.0

       Route Type: C with 2 Driver(s)   Time Bias:   .70  Mile Bias:   .30  Toll Bias:  1.00

        The following constraints are in effect:
           Route avoids links prohibiting truck use
           Route avoids ferry crossings

        Mileage by Highway Sign Type:
                Interstate:     .0    U.S.:     .0  State:     .0   Turnpike:     .0
                    County:     .0   Local:   26.0  Other:     .0

        Mileage by Highway Lane Type:
              Limited Access Multilane:     .0  Limited Access Single Lane:     .0
                     Multilane Divided:     .0         Multilane Undivided:     .0
              Principal Highways:     .0   Through Highways:     .0   Other:   26.0

                                             State Mileage
                                             -------------
                                              UT     26.0
```

```
                                            HIGHWAY  3.4                            Page    2
*********************************************************************************************

            TIMPIE            I80  X77  UT       to       PFSF                       UT

*********************************************************************************************

          .0            TIMPIE            I80  X77  UT        .0   0:00   1/28/99 at  9:44
        26.0  LOCAL     PFSF                        UT      26.0   0:35   1/28/99 at 10:19
```

HIGHWAY 3.4 Page 3

****

TIMPIE I80 X77 UT to PFSF UT

****

			MILEAGE WITHIN DENSITY LEVELS						
			<0.0	5.0	22.7	59.7	139	326	
State	Miles	0	-5.0	-22.7	-59.7	-139	-326	-821	>821
UT	26.0	7.9	14.2	3.9	.0	.0	.0	.0	.0
Route Total	26.0	7.9	14.2	3.9	.0	.0	.0	.0	.0
Percentages		30.2	54.7	15.1	.0	.0	.0	.0	.0

Basis: 1990 Census

RADTRAN Input Data	Rural	Suburban	Urban	
Weighted Population				
People/sq. mi.	3.5	.0	.0	
People/sq. km.	1.3	.0	.0	
Distance				Total
Miles	26.0	.0	.0	26.0
Kilometers	41.8	.0	.0	41.8
Percentage	100.0	.0	.0	
Basis (people/sq. mi.)	<139	139-3326	>3326	1990 Census

Note: Due to rounding, the sum of the mileages in the individual population categories may not equal the total mileage shown on this report.

C.10 Interline Output for the Route Between Skull Valley, Utah, and the Utah-Nevada Border

```
   INTERLINE 5.10  NETWORK 14.00

   ROUTE FROM:  UP   16153-PFSF                 UT     LENGTH:   353.7 MILES
           TO:  UP   13615-UVADA                UT  POTENTIAL:  359.96


  MILEAGE SUMMARY BY RAILROAD          A-M   B-M   A-BR  B-BR  OTHER
                      UP    353.7    321.7    .0    .0  32.0     .0
                           -  -  -  -  -  -  -  -  -  -  -  -  -  -
                    TOTAL   353.7    321.7    .0    .0  32.0     .0
   MILEAGE SUMMARY BY STATE
           353.7-UT



     RR      NODE             STATE  DIST
    UP   16153-PFSF             UT     0.
    UP   13594-GARFIELD         UT    85.
    UP   13630-LYNNDYL          UT   188.
    UP   13615-UVADA            UT   354.



   POPULATION DENSITY FROM:  UP   16153-PFSF                UT
                        TO:  UP   13615-UVADA               UT

         ------------------  MILEAGE WITHIN DENSITY LEVELS  -------------------
               <0.0   5.0  22.7  59.7   139   326   821  1861  3326  5815
St Miles    0  -5.0 -22.7 -59.7  -139  -326  -821 -1861 -3326 -5815 -9996 >9996
-------------------------------------------------------------------------------

UT 353.7112.5 203.5  27.5   4.6   2.2    .9    .7   1.4    .5    .0    .0    .0

Totals
   353.7112.5 203.5  27.5   4.6   2.2    .9    .7   1.4    .5    .0    .0    .0
Percentages
         31.8  57.5   7.8   1.3    .6    .2    .2    .4    .1    .0    .0    .0
Basis: 1990 Census data

   RADTRAN Input Data      Rural Suburban    Urban

   Weighted Population
        People/sq. mi.       3.7   1076.3       .0
        People/sq. km.       1.4    415.5       .0

   Distance                                         Total
        Miles              350.2      3.5       .0    353.7
        Kilometers         563.7      5.6       .0    569.2
        Percentage          99.0      1.0       .0

   Basis (people/sq. mi.)   <139 139-3326    >3326

   Note: Due to rounding, the sum of the mileages in the individual
         population categories may not equal the total mileage shown
         on this report.
```

C.11 Interline Output for the Route Between Timpie, Utah, and the Utah-Nevada Border

```
   INTERLINE 5.10  NETWORK 14.00

   ROUTE FROM:  UP   13516-TIMPIE              UT     LENGTH:   299.7 MILES
           TO:  UP   13615-UVADA               UT  POTENTIAL:  239.76


  MILEAGE SUMMARY BY RAILROAD           A-M   B-M   A-BR  B-BR  OTHER
                        UP    299.7    299.7    .0    .0    .0     .0
                             -  -  -  -  -  -  -  -  -  -  -  -  -  -
                      TOTAL   299.7    299.7    .0    .0    .0     .0
   MILEAGE SUMMARY BY STATE
           299.7-UT



     RR      NODE            STATE  DIST
    UP   13516-TIMPIE          UT     0.
    UP   13594-GARFIELD        UT    31.
    UP   13630-LYNNDYL         UT   134.
    UP   13615-UVADA           UT   300.



   POPULATION DENSITY FROM:  UP   13516-TIMPIE              UT
                        TO:  UP   13615-UVADA               UT

         ------------------  MILEAGE WITHIN DENSITY LEVELS  -------------------
               <0.0   5.0  22.7  59.7   139   326   821  1861  3326  5815
St Miles    0  -5.0 -22.7 -59.7  -139  -326  -821 -1861 -3326 -5815 -9996 >9996
--------------------------------------------------------------------------------

UT 299.7 58.5 203.5  27.5   4.6   2.2    .9    .7   1.4    .5    .0    .0    .0

Totals
   299.7 58.5 203.5  27.5   4.6   2.2    .9    .7   1.4    .5    .0    .0    .0
Percentages
         19.5  67.9   9.2   1.5    .7    .3    .2    .5    .2    .0    .0    .0
Basis: 1990 Census data

   RADTRAN Input Data      Rural Suburban    Urban

   Weighted Population
        People/sq. mi.       4.4   1076.3       .0
        People/sq. km.       1.7    415.5       .0

   Distance                                         Total
        Miles              296.2      3.5       .0    299.7
        Kilometers         476.8      5.6       .0    482.3
        Percentage          98.8      1.2       .0

   Basis (people/sq. mi.)   <139 139-3326    >3326

   Note: Due to rounding, the sum of the mileages in the individual
         population categories may not equal the total mileage shown
         on this report.
```

C.12 Interline Output for the Route Between the Maine Yankee Nuclear Plant and the Wyoming Site

```
 INTERLINE 5.10  NETWORK 14.00

 ROUTE FROM:  <C3>    96-MAINE YANKEE NP     ME     LENGTH:  2440.2 MILES
         TO:  BNSF 13499-BONNEVILLE          WY  POTENTIAL:  3372.5


MILEAGE SUMMARY BY RAILROAD          A-M   B-M   A-BR  B-BR  OTHER
                      BNSF 1225.9   1061.5 164.4    .0    .0     .0
                      CPRS  352.7    209.8 142.9    .0    .0     .0
                      NS    517.6    517.6    .0    .0    .0     .0
                      IHB    20.0     20.0    .0    .0    .0     .0
                      ST    293.0       .0 278.0    .0  15.0     .0
                      <C3>   31.0       .0    .0    .0  31.0     .0
                           -  -  -  -  -  -  -  -  -  -  -  -  -  -
                    TOTAL  2440.2   1808.9 585.3    .0  46.0     .0
 MILEAGE SUMMARY BY STATE
         203.5-IL    148.7-IN    286.0-IA    100.9-ME    151.0-MA
         512.0-NE     31.4-NH    460.4-NY    245.9-OH     44.0-PA
           6.0-VT    250.4-WY



   RR      NODE            STATE  DIST
  <C3>    96-MAINE YANKEE NP ME     0.
  <C3>   121-BRUNSWICK       ME    31.
 - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
  ST     121-BRUNSWICK       ME    31.
  ST     135-YARMOUTH JCT    ME    45.
  ST     132-PORTLAND        ME    61.
  ST     142-DOVER           NH   112.
  ST     291-LAWRENCE        MA   147.
  ST     299-LOWELL          MA   160.
  ST     423-AYER            MA   177.
  ST     432-FITCHBURG       MA   190.
  ST     447-MILLERS FALLS   MA   237.
  ST     454-GREENFIELD      MA   243.
  ST     694-MECHANICVILLE   NY   324.
 - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
  CPRS   694-MECHANICVILLE   NY   324.
  CPRS   706-SCHENECTADY     NY   337.
  CPRS  1037-BINGHAMTON      NY   467.
  CPRS  1039-WAVERLY         NY   507.
  CPRS  1008-ELMIRA          NY   525.
  CPRS  1009-CORNING         NY   543.
  CPRS   881-NIAGARA JCT     NY   665.
  CPRS   880-BUFFALO         NY   677.
 - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
  NS     880-BUFFALO         NY   677.
  NS     938-DUNKIRK         NY   718.
  NS     942-WESTFIELD       NY   742.
  NS     968-ERIE            PA   771.
  NS    2652-CONNEAUT        OH   795.
  NS    2649-ASHTABULA       OH   809.
  NS    2727-PAINESVILLE     OH   835.
  NS    2728-CLEVELAND       OH   865.
  NS    2633-ELYRIA          OH   892.
  NS   14985-OAK HARBOR      OH   949.
  NS    3442-TOLEDO          OH   971.
  NS    3526-GOSHEN          IN  1093.
  NS    3525-ELKHART         IN  1103.
  NS    4022-SOUTH BEND      IN  1118.
```

NS	3969-LA PORTE	IN	1144.
NS	4067-PORTER	IN	1163.
NS	4069-MILLER	IN	1173.
NS	4070-GARY	IN	1178.
NS	4073-CLARKE	IN	1182.
NS	4075-EAST CHICAGO	IN	1185.
NS	4076-HAMMOND	IN	1188.
NS	4228-BURNHAM / CALUME	IL	1190.
NS	4223-DOLTON / RIVERDA	IL	1194.
- TRANSFER			
IHB	4223-DOLTON / RIVERDA	IL	1194.
IHB	4163-BLUE ISLAND	IL	1198.
IHB	4164-CHICAGO RIDGE	IL	1204.
IHB	4172-ARGO	IL	1210.
IHB	4170-LA GRANGE	IL	1214.
- TRANSFER			
BNSF	4170-LA GRANGE	IL	1214.
BNSF	4190-AURORA	IL	1239.
BNSF	4478-GALESBURG	IL	1359.
BNSF	10381-BURLINGTON	IA	1401.
BNSF	10373-OTTUMWA	IA	1476.
BNSF	10367-ALBIA	IA	1499.
BNSF	10443-CRESTON	IA	1592.
BNSF	10435-PACIFIC JCT	IA	1674.
BNSF	11537-OREAPOLIS	NE	1683.
BNSF	11470-ASHLAND	NE	1708.
BNSF	11504-LINCOLN	NE	1731.
BNSF	11475-AURORA	NE	1808.
BNSF	11406-GRAND ISLAND	NE	1826.
BNSF	11289-ALLIANCE	NE	2101.
BNSF	11288-NORTHPORT	NE	2136.
BNSF	13470-GUERNSEY	WY	2231.
BNSF	13474-CASPER	WY	2340.
BNSF	13499-BONNEVILLE	WY	2440.

POPULATION DENSITY FROM: <C3> 96-MAINE YANKEE NP ME
TO: BNSF 13499-BONNEVILLE WY

------------------ MILEAGE WITHIN DENSITY LEVELS -------------------

St	Miles	0	<0.0 -5.0	5.0 -22.7	22.7 -59.7	59.7 -139	139 -326	326 -821	821 -1861	1861 -3326	3326 -5815	5815 -9996	>9996
IL	203.5	14.1	41.1	42.0	26.5	15.4	9.1	8.3	11.9	12.5	14.6	6.1	2.0
IN	148.7	8.2	24.9	13.5	25.3	13.5	13.7	14.5	12.4	11.1	7.7	2.9	1.0
IA	286.0	12.5	87.0	110.0	25.0	14.4	7.7	8.0	9.9	7.1	3.7	.6	.0
ME	100.9	17.6	3.2	4.4	5.1	10.6	37.1	16.7	3.7	1.0	.3	.2	.9
MA	151.0	2.6	3.8	5.5	29.0	15.5	29.9	26.4	22.5	6.4	4.1	2.2	3.2
NE	512.0	20.0	265.2	120.8	46.6	21.1	13.0	8.7	7.4	3.5	3.3	2.0	.5
NH	31.4	1.1	.2	.6	1.5	4.2	10.4	6.7	5.3	1.1	.4	.0	.0
NY	460.4	45.8	37.1	44.6	100.3	99.0	57.7	30.3	21.8	12.2	5.8	3.7	2.1
OH	245.9	27.3	5.5	9.1	23.5	32.4	37.7	36.5	33.3	18.1	13.8	7.3	1.5
PA	44.0	1.0	1.3	.3	1.8	9.3	13.3	4.8	4.4	2.2	3.6	1.7	.4
VT	6.0	.0	.0	.0	.0	6.0	.0	.0	.0	.0	.0	.0	.0
WY	250.4	41.1	163.6	21.9	6.4	3.5	4.7	4.3	1.4	.7	1.2	1.3	.2
Totals	2440.2	191.2	632.8	372.8	291.0	244.9	234.1	165.1	134.1	75.7	58.4	28.0	11.7
Percentages		7.8	25.9	15.3	11.9	10.0	9.6	6.8	5.5	3.1	2.4	1.1	.5

Basis: 1990 Census data

RADTRAN Input Data Rural Suburban Urban

Weighted Population				
People/sq. mi.	24.9	862.6	6170.9	
People/sq. km.	9.6	333.0	2382.6	
Distance				Total
Miles	1732.8	609.0	98.2	2440.2
Kilometers	2788.5	980.1	158.0	3927.0
Percentage	71.0	25.0	4.0	
Basis (people/sq. mi.)	<139	139-3326	>3326	

Note: Due to rounding, the sum of the mileages in the individual population categories may not equal the total mileage shown on this report.

C.13 Interline Output for the Route Between the Wyoming Site and the Utah-Nevada Border

```
   INTERLINE 5.10  NETWORK 14.00

   ROUTE FROM:  BNSF 13499-BONNEVILLE          WY     LENGTH:  1110.8 MILES
           TO:  UP   13615-UVADA               UT  POTENTIAL:  1391.9

  MILEAGE SUMMARY BY RAILROAD           A-M   B-M   A-BR  B-BR  OTHER
                      BNSF  323.4     37.0 286.4    .0    .0     .0
                      UP    787.4    787.4    .0    .0    .0     .0
                           -  -  -  -  -  -  -  -  -  -  -  -  -  -
                    TOTAL  1110.8    824.4 286.4    .0    .0     .0
   MILEAGE SUMMARY BY STATE
           389.8-UT    721.0-WY

     RR      NODE            STATE  DIST
    BNSF 13499-BONNEVILLE      WY     0.
    BNSF 13474-CASPER          WY   100.
    BNSF 13465-CHEYENNE        WY   323.
   - - - - - - - - - - - - - - - - - - - - - - - - TRANSFER
    UP   13465-CHEYENNE        WY   323.
    UP   13462-LARAMIE         WY   375.
    UP   13494-GRANGER         WY   651.
    UP   13568-OGDEN           UT   795.
    UP   13595-SALT LAKE CITY  UT   830.
    UP   13594-GARFIELD        UT   842.
    UP   13630-LYNNDYL         UT   945.
    UP   13615-UVADA           UT  1111.


   POPULATION DENSITY FROM:  BNSF 13499-BONNEVILLE          WY
                      TO:  UP   13615-UVADA               UT

         ------------------  MILEAGE WITHIN DENSITY LEVELS  -------------------
               <0.0   5.0  22.7  59.7   139   326   821  1861  3326  5815
St Miles    0  -5.0 -22.7 -59.7  -139  -326  -821 -1861 -3326 -5815 -9996 >9996
-------------------------------------------------------------------------------

UT 389.8 56.4 240.5  47.0   7.5   4.6   3.5   5.5   8.4   7.6   6.4   2.0    .2
WY 721.0142.9 483.1  43.9  23.1   6.9   5.7   6.7   4.2   1.2   1.5   1.5    .2

Totals
  1110.8199.4 723.7  90.9  30.6  11.5   9.2  12.3  12.6   8.8   8.0   3.5    .4
Percentages
         17.9  65.1   8.2   2.8   1.0    .8   1.1   1.1    .8    .7    .3    .0
Basis: 1990 Census data

   RADTRAN Input Data      Rural Suburban    Urban

   Weighted Population
        People/sq. mi.       5.2   1141.9   5724.0
        People/sq. km.       2.0    440.9   2210.1

   Distance                                         Total
        Miles             1056.0     42.9     11.8   1110.8
        Kilometers        1699.5     69.1     19.0   1787.6
        Percentage          95.1      3.9      1.1

   Basis (people/sq. mi.)   <139 139-3326    >3326

   Note: Due to rounding, the sum of the mileages in the individual
         population categories may not equal the total mileage shown
         on this report.
```

C.14 References

Johnson, P. E., et al. 1993. *INTERLINE 5.0, An Expanded Railroad Routing Model: Program Description, Methodology, and Revised Users Manual*, ORNL/TM-12090, Oak Ridge National Laboratory, Oak Ridge, Tenn.

APPENDIX D

TRANSPORTATION RISK ANALYSIS

To supplement the less-detailed discussions in Chapter 5, this appendix contains: (1) a description of RADTRAN4 and the major assumptions used in estimating the doses for the cross-country (i.e., from reactor sites to PFSF) and regional (i.e., within the State of Utah) analyses; (2) a summary of NUREG-0170 (NRC 1977); (3) an analysis of the regional transportation risks for Utah; and (4) an analysis of the regional transportation risk for the alternative site in Wyoming.

D.1 The RADTRAN4 Computer Code

As part of the analysis of potential impacts in this FEIS, a transportation risk assessment was performed using the INTERLINE routing code (see Appendix C) and the RADTRAN4 risk assessment code. This section describes the RADTRAN4 computer code and how it was used in the assessment of incident-free transportation conditions and accident scenarios

D.1.1 The RADTRAN4 Incident-Free Model

The RADTRAN4 calculations for generating estimates of the incident-free transportation dose to the public are based on expressing the dose rate as a function distance of from a point source (Neuhauser and Kanipe 1993). RADTRAN4 estimates doses to the number of persons expected to be exposed to the SNF shipment and calculates an overall risk to the public based on the total dose. Associated with the calculation of the incident-free doses for each exposed population group are parameters such as the radiation field strength, source-receptor distance, duration of exposure, vehicular speed, traffic density, and route characteristics (such as population density). The RADTRAN4 manual contains derivations of the equations and descriptions of these parameters (Neuhauser and Kanipe 1993).

The RADTRAN4 code calculates the dose to the public in an area that runs along the rail line and extends perpendicular from both sides of the track to a distance from 30 m to 800 m (98 ft to 0.5 mile). Added to this computed dose are the collective doses for persons that share the transportation route (e.g., oncoming passenger trains passing on parallel tracks). The dose (in mrem) received by each person in that defined area is a function of the dose rate (in mrem/hr) at 1 m from the cask surface, the distance that person is from the track, and the speed of the train as it passes by. The RADTRAN4 manual contains the derivations of the equations and descriptions of the parameters used in the code (Neuhauser and Kanipe 1993).

The radiation field that surrounds the cask decreases markedly as the distance from the cask increases. At distances from 30 m to 800 m (98 ft to 0.5 mile), the cask will appear almost like a point source and therefore, the dose rate will decrease as the square of the distance from the cask. Figure D.1 illustrates the approximate dose rate as a function of distance from a cask that reads 0.13 mSv/hr (13 mrem/hr) at 1 m (3 ft) from its surface, assuming the radiation field exists in a vacuum (e.g., there would be no buildup nor attenuation of the gamma rays in air). In this FEIS, each

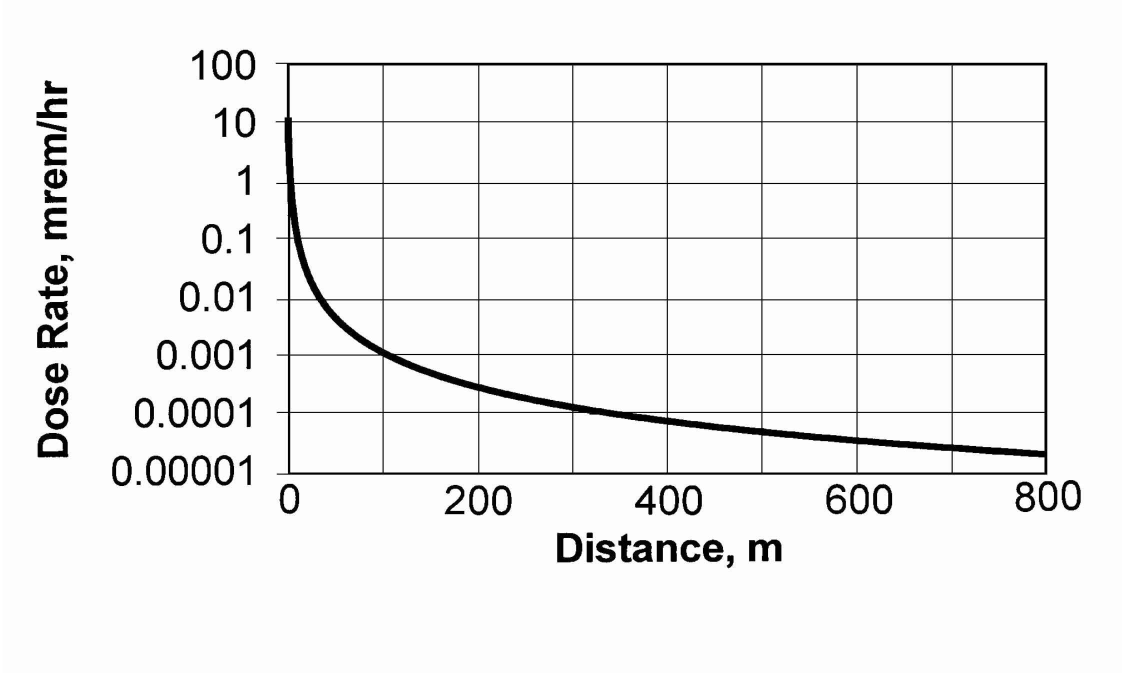

Figure D.1. Estimated dose rate as a function of distance from a cask reading 0.13 mSv/hr (13 mrem/hr) at 1 m (3 ft) from its surface.

cask was assumed to have a dose rate of 0.13 mSv/hr at a distance of 1 m (13 mrem/hr at 3 ft) from the cask surface, which is equivalent to the regulatory limit of 0.1 mSv/hr at 2 m (10 mrem/hr at 6.5 ft). Both point-source and line-source approximations were used based upon the distance between the exposed individuals and the radiation source. The source term was conservatively assumed to consist entirely of gamma radiation for calculation of the incident-free dose. Actual cask radiation levels are measured prior to each shipment and in practice are expected to be lower than the regulatory limit.

Note that to estimate the dose received by a person at a specific distance from the track, the dose rate and exposure time at that distance are accounted for. In general, exposure time is expected to be only a few minutes as the train passes by (depending on the train speed). Given the population density along various parts of the route, RADTRAN4 integrates the exposure of all persons at all distances from the track out to the maximum distance from the rail line. That product is multiplied by the population density to determine the collective dose to the population along a specific route.

Radiation doses to the population and workers were converted to estimates of LCFs using the upper limit risk coefficient suggested by the National Academy of Sciences (NAS) (ICRP 1991; NAS 1990). The NAS report, commonly called the "BEIR V report," gives statistics on the number of cancer deaths expected to occur from a continuous exposure of 1 rem/year above background from age 18 until age 65. This value results in a risk factor of 4.0×10^{-6} LCFs per person-Sv (4.0×10^{-4} LCFs per person-rem) that is more applicable to occupational exposures. The BEIR V report also considers the number of cancer deaths expected to occur from a continuous lifetime exposure of 0.001 Sv/yr (0.1 rem/yr) above background which results in a risk factor of 5×10^{-6} LCFs per person-Sv (5.0×10^{-4} LCFs per person-rem) that is more applicable to exposures of the general public. Note that even though the assumed general public exposure is less than the assumed occupational exposure, the general public LCF risk factor is slightly higher. This is because the general public dose is assumed to occur over an entire lifetime as opposed to the occupational work period (e.g., 8-hr day shift) from age

18 until age 65. Both of these risk factors were used in this study depending upon whether the exposures were occupational or general population exposures.

D.1.2 Population Assumptions for Incident-Free transport

The RADTRAN4 calculations of risk for incident-free rail transportation include exposures of the following population groups:

- *Persons along the Route (Off-Link Population)*. Collective doses are calculated for all persons living or working within 0.8 km (0.5 miles) on each side of the transportation route. The total number of persons within this 1.6-km (1-mile) corridor is calculated separately for each route considered in the assessment.
- *Persons sharing the Route (On-Link Population)*. Collective doses are calculated for persons in all vehicles sharing the transportation route. This group includes persons traveling in the same or the opposite direction as the shipment, as well as persons in the vehicles passing the shipment.
- *Persons at Stops.* Collective doses are normally calculated for people who may be exposed while a shipment is stopped en route. The distance of each route analyzed for the regional transportation analysis was relatively short [i.e., approximately 400 km (250 miles)]; therefore, no rail stops were assumed. For the cross-country analysis a minimum of two stops were assumed.
- *Crew Members.* Collective doses are calculated for rail crew members according to the method described in the RADTRAN 4 technical manual.

The doses calculated by RADTRAN4 for the first three population groups are added to yield the collective dose to the public. The dose calculated for the fourth group represents the dose to workers (in this case the crew members, inspectors, and rail yard workers). This is added to the dose received by ITF workers (for the alternatives where an ITF would be utilized) to yield the total collective worker dose.

In the RADTRAN4 calculations performed for this FEIS, three population density zones (rural, suburban, and urban) were used to compute the risk between the origin-and-destination pairs of every rail route which ended at either the PFSF site in Utah or the alternative candidate site in Wyoming. The fractions of travel in each zone were determined by using the INTERLINE (rail) routing model (Johnson, et. al. 1993) as described in Appendix C of this FEIS. The routing model identified the specific population densities in each zone along each route based on the 1990 census data. Population density information in each of the three population density zones is based on an aggregation of the twelve population density zones provided in the INTERLINE output and is compatible with the RADTRAN4 code.

D.1.3 Risks During Incident-Free Transportation

The results of the RADTRAN4 computer runs are displayed in Chapters 5 and 7 of this FEIS for the cross-country analysis. A brief summary of the regional transportation analysis is also included there. Sections D.3 and D.4 in this appendix present more detailed results of the regional transportation analysis. The output includes dose calculations for the public and the workers. These dose calculations have been converted into LCFs by the use of appropriate conversion factors. Numerical values for doses and LCFs appear in Chapters 5 and 7 of this FEIS as well as Sections D.3 and D.4 in this appendix.

D.1.4 Transportation Accident Risks

RADTRAN4 was used to compute the doses to the public in the event of an accident that releases radioactive materials to the environment. The RADTRAN4 calculations performed for this FEIS used a cask inventory calculated using the ORIGEN Code (Croff 1980) and severity and release fractions taken from the Modal Study (Fischer 1987). A release fraction is the fraction of the radioactive material in the spent fuel cask that could be released from that cask during an accident of a certain severity. The severity fraction is the fraction of all accidents that are of a specified severity, i.e., fall within a range of accident conditions produced by specified collision forces and fire temperatures. Release fractions take into account both the fraction of the spent fuel rods in the cask that fail and also all mechanisms necessary to cause the release of radioactive material from a failed fuel rod into a damaged shipping cask and then from the damaged cask into the environment. Release fractions vary according to the shipping cask type and the physical form of the radioactive materials released from the cask (i.e., particulate, volatile solid, gas).

In the case of SNF, there would be some solids, gases, and volatile materials that could be released in the event that spent fuel rods fail and the cask seal is breached in a severe accident. Some of the radioactive gases that are generated in the fuel pellets, and that had diffused and collected in the helium gas plenum of each spent fuel rod, would be released to the cask cavity from each fuel rod that is ruptured in an accident. Volatile gases generally require heat to cause them to diffuse into the gas plenum and remain in a gaseous form. Particulates would come from fuel pellets, some of which could be crushed, producing fines, a powder-like material. The fines would be carried out of the failed rod into the cask cavity by the depressurization flow of helium gas. Once this powdery material and the gases are freed into the cask cavity, if the cask is breached some fraction of that material could be released from the cask to the environment. The most likely breach in a shipping cask would be caused by a seal that failed in the accident, opening a small leak path from the cask cavity to the environment.

CRUD is a colloquial term for corrosion and wear products (rust particles, etc.) that become radioactive (i.e., activated) when exposed to radiation in the reactor vessel. The term is popularly considered to be an acronym for Chalk River Unidentified Deposits, as Chalk River is the Canadian plant at which the activated deposits were first discovered. CRUD can plate out on hot surfaces in the primary reactor coolant system such as fuel rods. Activation of nickel in the corrosion products produces Co-60 which, after 5 years cooling time out of a reactor, is the only constituent in CRUD that is significant for transportation risk assessment. This FEIS accounts for the presence of CRUD, and its decay, in its inventory quantity for Co-60 for 5 year cooled fuel (5.23×10^2 Ci, see Table D.3). In order for CRUD particles to be released to the environment, there would need to be a break in the cask confinement boundary and a sufficient internal energy to dislodge, move, and emit them outside the cask.

D.1.4.1 Radionuclide Inventory

Each cask is assumed to contain 24 spent PWR fuel assemblies. The radionuclide inventory in the cask for the proposed SNF shipments to and from the PFSF and which was used in the RADTRAN4 calculations is given in Table D.1. All spent fuel shipped to the PFS site was assumed to have an average burnup of 40,000 MWD/MTU and to have cooled for five years. Activation products, actinides, and fission products were all identified and those elements whose activities exceeded about 1 percent of the total are listed in Table D.1.

Table D.1 Radionuclide inventory for the proposed SNF shipments

Isotope	Ci/shipping canister - 5 years cooled	Ci/shipping canister - 20 years cooled	Physical/chemical group	Dispensability category
Cobalt-60 (CRUD only)	5.23×10^2	7.27×10^1	particulates/CRUD	6
Krypton-85	9.07×10^4	3.43×10^4	gas	10
Strontium-90	8.86×10^5	6.19×10^5	volatile	7
Ruthenium-106	1.84×10^5	6.07×10^0	volatile	7
Cesium-134	4.20×10^5	2.71×10^3	volatile	7
Cesium-137	1.23×10^6	8.66×10^5	volatile	7
Promethium-147	4.06×10^5	7.70×10^3	particulates	2
Samarium-151	5.35×10^3	4.78×10^3	particulates	2
Europium-154	8.76×10^4	2.62×10^4	particulates	2
Plutonium-238	4.37×10^4	3.89×10^4	particulates	2
Plutonium-239	4.34×10^3	4.34×10^3	particulates	2
Plutonium-240	6.19×10^3	6.22×10^3	particulates	2
Plutonium-241	1.25×10^6	6.10×10^5	particulates	2
Americium-241	1.34×10^4	3.43×10^4	particulates	2
Americium-243	2.35×10^2	2.38×10^2	particulates	2
Curium-242	4.54×10^2	2.03×10^2	particulates	2
Curium-244	2.74×10^4	1.54×10^4	particulates	2
Total activity	$\mathbf{4.65 \times 10^6}$	$\mathbf{2.27 \times 10^6}$		

The dispensability categories shown in Table D.1 are used in RADTRAN to characterize the relative dispensability in the environment of each radionuclide assigned to the category if it escapes from the cask. RADTRAN4 uses the dispensability category to determine the fraction of a radionuclide's inventory that is aerosolized and the fraction of the aerosolized material that is respirable. RADTRAN4 contains default values for the aerosolized and respirable fractions of the total inventory that are keyed to the assigned dispersibility categories. Normally, the assignment of dispersibility categories to radionuclides by the RADTRAN4 user causes these default values to be used. However, because the release fractions in Table D.2 below already account for these aerosolized and respirable fractions, the default values in the RADTRAN4 input were all reset to values of 1.0.

D.1.4.2 Modal Study Accident Matrix

The analyses performed for the Modal Study (Fischer, 1987) developed: (1) a rail accident event tree, (2) the probability that each scenario on that tree involved a fire, (3) distributions of fire duration, fire temperature, fire location, accident speed, cask orientation at impact, and cask impact angle, and (4) equations that expressed the dependence of cask inner shell strain on cask impact parameters. Table 5.11 in the Modal Study specifies how these results were used to determine the probabilities that accidents would fall into one of the twenty bins in the 4 x 5 accident matrix (y-axis bin boundaries specified in terms of cask inner shell strain, x-axis bin boundaries specified in terms of lead mid-thickness temperature), and bin indices that have the form (y,x). Figure D.2 presents this 20 bin matrix and gives the index number for each bin and the conditional probability (conditional on the occurrence of some accident of any severity) that a vehicle accident will cause a spent fuel cask to experience the mechanical and thermal loads that fall within each bin. In this figure, the six accident categories for which different release fractions were developed in the Modal Study are outlined by heavy black borders.

D.1.4.3 Modal Study Release Fractions

To complete the development of accident source terms, a set of release fractions has to be associated with each accident bin in the 20-bin accident matrix depicted in Figure D.2. For the Modal Study, release fractions ($f_{release}$) were calculated using the following equation

$$f_{release} = (f_{rod})(f_{rod\text{-}to\text{-}cask})(f_{cask\text{-}to\text{-}environment}) \qquad \text{(Eq. D.1)}$$

where f_{rod} is the fraction of the spent fuel rods in the spent fuel cask that would be failed under the specified bin conditions, $f_{rod\text{-}to\text{-}cask}$ is the fraction of each radionuclide that would be released from the failed rods into the interior of the cask, and $f_{cask\text{-}to\text{-}environment}$ is the fraction of the amount of each radionuclide that was released into the cask that would escape from the cask through the cask leak to the environment. Because deposition of particles and condensation of vapors onto cask interior surfaces was conservatively neglected in the Modal Study analysis, $f_{cask\text{-}to\text{-}environment} = 1.0$, and Eq. D.1 reduces to

$$f_{release} = (f_{rod})(f_{rod\text{-}to\text{-}cask}) \qquad \text{(Eq. D.2)}$$

To simplify the analysis, values for $f_{rod\text{-}to\text{-}cask}$ were developed for three classes of radionuclide species: non-condensible gases, condensible gases (vapors), and particles (aerosols). Only one element, Krypton (Kr), was assigned to the non-condensible gas class; three elements, iodine (I), cesium (Cs), and ruthenium (Ru), were assigned to the condensible gas class; and all other elements were assumed to transport as constituents of particles and were thus assigned to the particles class.

In the Modal Study, values for f_{rod} were determined as follows. Cask inner shell strains less than 0.2 percent were assumed to fail 3 percent of the rods in the cask ($f_{rod} = 0.03$), strains between 0.2 and 2 percent were assumed to fail 10 percent of the rods in the cask ($f_{rod} = 0.1$), and strains greater than 2 percent were assumed to fail 100 percent of the rods in the cask ($f_{rod} = 1.0$). Any unfailed rod that is heated to temperatures over 650°F was assumed to fail by burst rupture.

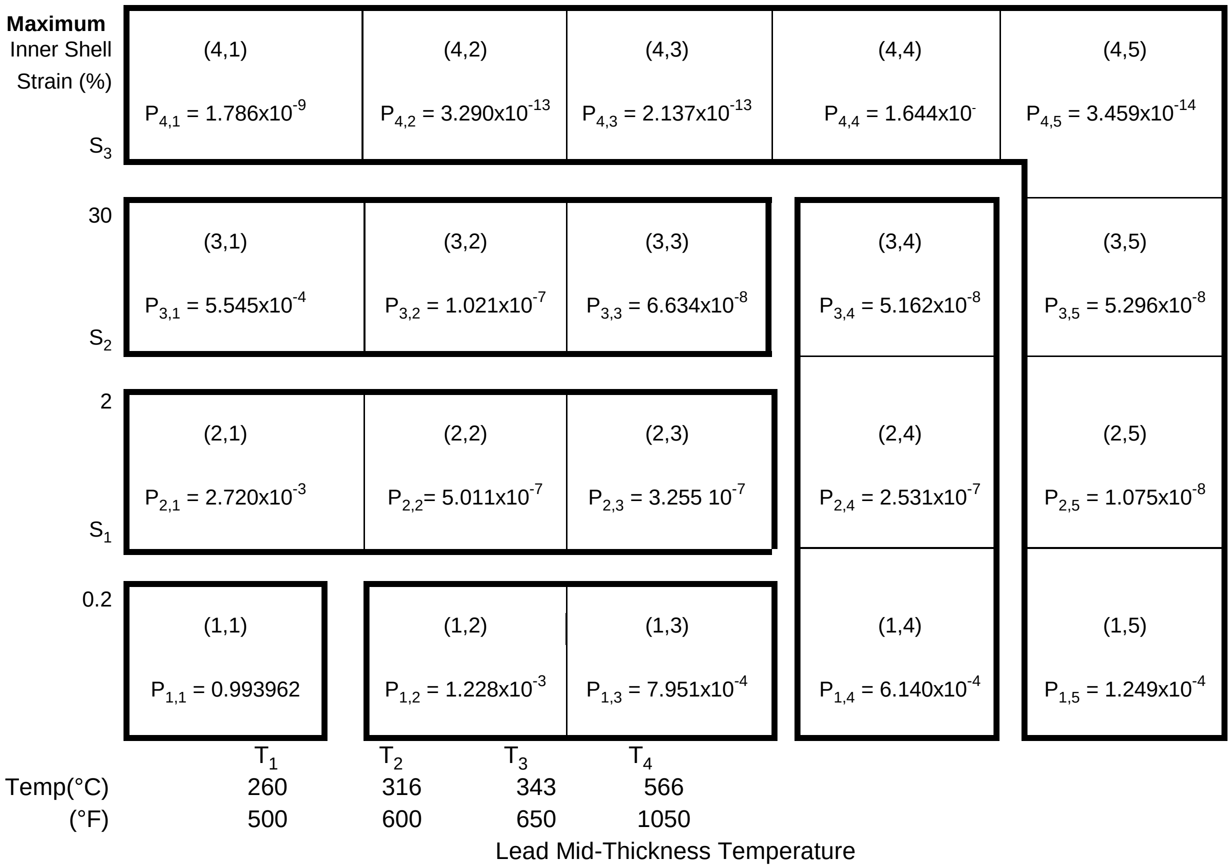

Figure D.2 Modal Study Accident Matrix

Modal Study rod-to-cask release fraction values were based on experimental studies (Lorentz 1980). Lorenz et al., examined the release of fission products from spent fuel rod sections when the rod sections were failed by burst rupture as a result of heating to elevated temperatures in steam or air atmospheres. Release by diffusion from rod sections, which had holes drilled through their cladding was also examined, but was found to be negligible when compared to the releases that occurred when rods failed by burst rupture. Rod section failure by burst rupture in air atmospheres was found to increase the release of I, Cs, and Ru. The increases were assumed to be caused by oxidation of uranium dioxide in fuel pellets which allowed iodine and cesium compounds to migrate more easily to the surface of the pellets and converted ruthenium from a relatively involatile oxide (RuO_2) to a significantly more volatile oxide (RuO_4). Review of the experimental results of Lorenz et al. led the Modal Study staff to define two sets of rod-to-cask release fractions. Each set was calculated as the sum of a release that occurs upon rod burst rupture and the release that occurs when the fuel is oxidized by exposure to air at temperatures above 400°F. Two sets of oxidative release fractions were selected, one for use below 650°F and the second for use between 650 and 1050°F. Table D.2 presents both of these sets of rod-to-cask release fractions.

Table D.2 Modal Study Rod-to-Cask Release Fractions

Release Fraction Set	Applicable Accident Matrix Bins	Release Mechanism	$f_{rod\text{-}to\text{-}cask}$				
			Gases	Vapors			Particles
			Kr	I	Cs	Ru	All other elements
1	(1,1) through (1,3) (2,1) through (2,3) (3,1) through (3,3)	Rod Burst	$2.0x10^{-1}$	$3.0x10^{-4}$	$2.0x10^{-4}$	$2.0x10^{-5}$	$2.0x10^{-6}$
		Oxidation	$1.3x10^{-1}$	$2.2x10^{-3}$	$1.0x10^{-6}$	$6.7x10^{-6}$	0
		Total	$3.3x10^{-1}$	$2.5x10^{-3}$	$2.0x10^{-4}$	$2.7x10^{-5}$	$2.0x10^{-6}$
2	(1,4) through (3,4)	Rod Burst	$2.0x10^{-1}$	$3.0x10^{-4}$	$2.0x10^{-4}$	$2.0x10^{-5}$	$2.0x10^{-6}$
		Oxidation	$1.9x10^{-1}$	$4.0x10^{-3}$	$8.0x10^{-6}$	$2.8x10^{-5}$	0
		Total	$3.9x10^{-1}$	$4.3x10^{-3}$	$2.0x10^{-4}$	$4.8x10^{-5}$	$2.0x10^{-6}$

Release fractions for accident matrix bins (4,1) through (4,5) and (1,5) through (3,5), the bins at the top and the far right of the matrix depicted in Figure D.2, were calculated by multiplying the total values for $f_{rod\text{-}to\text{-}cask}$ by 10 for I, Cs, Ru, and particles and by 1.62 for Kr. Combining the rod failure fractions and the release fractions that apply to each accident bin develops five sets of release fractions. Moreover, because inner shell strains less than 0.2 percent and mid-lead layer temperatures less than 500°F were assumed not to cause the spent fuel cask to leak, by definition, accident matrix bin (1,1) had release fractions values of 0.0. These six accident category regions are depicted by heavy black borders and separate boxes in Figure D.2. Table D.3 presents the values of the severity fractions and release fractions that apply to each of these six accident categories and Table D.4 briefly describes the principal characteristics of the accidents that fall into each accident category.

The accident consequences and risks that were calculated using these severity and release fractions are presented in Chapter 5 of this FEIS. Accident severity levels progress from Category 1 to Category 6. Category 1 accidents occur frequently but are not severe enough to cause the spent fuel cask to leak. Category 6 represents the most severe accident scenarios, which would result in the largest releases of radioactive material. Accidents of this severity are very rare. The conservative estimate used here and in the Modal Study is that Category 6 accidents occur approximately 1 in every 10,000 rail accidents involving a radioactive waste shipment. On the basis of national accident statistics (Saricks and Kvitek 1994) for every 1.6 km (1 mile) of a loaded shipment, the probability per kilometer of an accident of this severity is 1.25×10^{-11}. For this EIS the estimated shipping distance for 4,000 casks is about 17.4 million kilometers (10.8 million miles), so no accident of such severity is expected to occur.

The fractional occurrences of accidents that occur on rural, suburban, and urban route segments is given in Table D.5 by the accident severity category. These values were taken from NUREG-0170. As Table D.5 shows, each population density zone was given the same distribution of accident frequencies within each of the six accident categories since information on the variation of accident frequency as a function of population density zones was not available. The values in Table D.5 are also included in Table D.3.

Table D.3. Spent fuel severity and release fractions used in this study to calculate accident consequences and risks

Accident Category	Bin Number	Severity Fraction	Release Fraction: Gases	Release Fraction: Volatiles	Release Fraction: Particulates
1	(1,1)	0.993962	0	0	0
2	(1,2), (1,3)	2.02×10^{-3}	9.9×10^{-3}	6.0×10^{-8}	6.0×10^{-8}
3	(2,1), (2,2), (2,3)	2.72×10^{-3}	3.3×10^{-2}	2.0×10^{-5}	2.0×10^{-7}
4	(3,1), (3,2), (3,3)	5.55×10^{-4}	3.3×10^{-1}	2.0×10^{-4}	2.0×10^{-6}
5	(1,4), (2,4), (3,4)	6.14×10^{-4}	3.9×10^{-1}	2.0×10^{-4}	2.0×10^{-6}
6	(4,1), (4,2), (4,3), (4,4), (4,5), (1,5), (2,5), (3,5)	1.25×10^{-4}	6.3×10^{-1}	2.0×10^{-3}	2.0×10^{-5}

Table D.4. Accident severity categories used in the analysis

Accident Severity Category	Description
Severity Category 1	Conditions do not exceed those for a Type B shipping cask; no release of contents
Severity Category 2	Collisions that fail 3 percent of the rods in the cask and/or fires that do not heat the cask to temperatures above 650°F
Severity Category 3	Collisions that fail 10 percent of the rods in the cask and/or fires that do not heat the cask to temperatures above 650°F
Severity Category 4	Collisions that fail 100 percent of the rods in the cask and/or fires that do not heat the cask to temperatures above 650°F
Severity Category 5	Collisions that fail 3 percent of the rods in the cask and also initiate fires that heat the cask to 650 to 1050°F
Severity Category 6	Collisions that fail 100 percent of the rods in the cask and/or fires that heat the cask to temperatures above 1050°F

Table D.5. Fraction of accident occurrences

Accident Severity Category	Accident Location		
	Rural	Suburban	Urban
1	$9.94x10^{-1}$	$9.94x10^{-1}$	$9.94x10^{-1}$
2	$2.02x10^{-3}$	$2.02x10^{-3}$	$2.02x10^{-3}$
3	$2.72x10^{-3}$	$2.72x10^{-3}$	$2.72x10^{-3}$
4	$5.55x10^{-4}$	$5.55x10^{-4}$	$5.55x10^{-4}$
5	$6.14x10^{-4}$	$6.14x10^{-4}$	$6.14x10^{-4}$
6	$1.25x10^{-4}$	$1.25x10^{-4}$	$1.25x10^{-4}$

Note that equation D.1, $f_{release} = (f_{rod})(f_{rod\text{-}to\text{-}cask})$, where $(f_{cask\text{-}to\ environment}) = 1.0$, does not account for the additional barrier that the cask has which should significantly impede the release of fission products from the cask in an accident. This barrier is the welded stainless steel canister that would contain the SNF and which would be lifted out of the cask as a single unit, and placed in storage at the PFSF. For this FEIS, this additional barrier provided by the canister was assumed not to exist. Thus, the potential release of fission products from this cask under accident scenarios discussed in this FEIS is considered very conservative.

D.1.4.4 CRUD

To determine if the assumption of using modal study release fractions for CRUD was appropriate, or if it results in an underestimate of the accident dose risk, the NRC staff further investigated this issue, as described below.

Following issuance of the DEIS, the NRC staff reviewed other available studies for estimates of the possible impacts of CRUD releases. The phenomena that would govern spallation of CRUD from spent fuel rod surfaces when subjected to accident loads, its transport through the spent fuel cask, and release to the environment, were examined in NUREG/CR-6672 (Sprung 1999). That examination suggests that CRUD release fractions of spent fuel, when transported in a rail cask, could range from 10^{-3} to 10^{-1} depending on the accident conditions and severity. In contrast, the FEIS release fraction for CRUD is lower, as the FEIS utilized the release fractions for particulates inside the fuel rods, which range from 6×10^{-8} to 2×10^{-5}.

To determine an absolute upper bond for the effects due to various CRUD release fractions, the Maine Yankee-to-PFSF RADTRAN rail calculation performed for this FEIS was repeated by using a 100 percent CRUD release, which bounds the assumption in NUREG/CR-6672. This repeat calculation produced a single shipment accident population dose risk (adjusted by a factor of 1.3 to account for future population) of 0.000806 person-Sv (0.0806 person-rem). This value can be compared to the single shipment accident population dose risk of 0.000236 person-Sv (0.0236 person-rem)[1] reported in FEIS Section 5.7.2.5. Thus, in this example, where all 523 Ci of Co-60 (i.e., all the CRUD) is assumed to be released for any category 2 through 6 accident, the accident population dose risk would increase by a factor of 3.4 (0.0806/0.0236). However, as shown in Table 5.7, the transportation accident population dose risk associated with the proposed PFSF is a small fraction of the values reported in NUREG-0170. If the dose risk for the transportation of SNF to the proposed PFSF in Table 5.7 is increased by a factor of 3.4 above the value shown in the DEIS, the resulting population dose risk would still be a small fraction of the NUREG-0170 value, and the FEIS conclusion that the accident population dose risk is small would be unchanged.

In reporting the results for this FEIS, the NRC staff considered the above information but has chosen, as the base-case, to retain its application of Modal Study release fractions for particulates to CRUD. There are several reasons for this decision. First, the NRC staff does not believe that 100 percent release of CRUD in any accident is physically possible because (1) much of the CRUD is chemically bonded or tightly adheres to the fuel rod surface, (2) a leak pathway large enough to allow 100 percent escape is not credible, (3) the particle size distribution of spalled crud would be expected to include larger particles that would settle out inside the cask or possibly plug leak paths, and (4) a driving force (i.e., pressure differential) does not exist that could enable a 100 percent release. Second, in performing the FEIS accident risk assessment, the NRC staff ignored (i.e., did not allow credit for) the presence of the welded canister of the HOLTEC HI-STAR system, which will in practice provide a significant additional barrier to the release of radioactive materials in transportation accidents. Third,

[1]The value of 0.0236 person-rem is the single-cask result reported in FEIS Section 5.7.2.5. Assuming four casks per train, an additional factor of 3.58 could be applied to the 0.0236 value, and the 0.0806 value, to obtain a result that assumes four casks have releases (as explained in FEIS Section 5.7.2.5). An additional factor of 50 (the number of 4-cask trains per year) could be applied to each value to obtain annual impacts (annual impacts are presented on many of the tables in this FEIS). In all cases the ratio between the example case of 100 percent crud release, and the FEIS methodology, will remain 3.4.

Co-60 has a radioactive half-life of 5.27 years, and its radioactivity decreases quickly in relation to the radioactivity in the spent fuel pellets. Therefore, CRUD importance to transport accident risk declines as cooling time increases, whereas the FEIS maximized its importance by conservatively assuming that the fuel is cooled for only 5 years even though PFS has indicated the average cooling time of SNF expected to be shipped to PFSF is 20 years. Fourth, the CRUD surface concentration on fuel assemblies, of 140 $\mu Ci/cm^2$, was conservatively selected based on the upper value observed by measurements of CRUD on rod surfaces (Sandoval et. al. 1991). Finally, the NRC staff believes that the Modal Study release fractions provide adequate estimates for the purpose of this FEIS of the releases of important nuclides for a range of severe accidents (because, for example, these release fractions assume no retention in the cask). In light of the above, the NRC staff has concluded that revision of the FEIS treatment of CRUD is not necessary, and that the radionuclide inventories and release fractions chosen in the FEIS provide an adequate characterization of transportation accident risk assessment results and adequate perspective regarding the importance of CRUD to the characterization of those results.

D.1.5 Intermodal Transportation and Cask Transfer Operations

D.1.5.1 Intermodal Transfer Facility (ITF) at Timpie, Utah

If the transport of SNF to the proposed PFSF occurs totally by rail (as would be the case if the new Skunk Ridge rail siding and rail line is constructed; see Chapter 2 of this FEIS), any doses during railcar switching or railyard operations would be covered by the RADTRAN4 rail transport calculation. However, if the SNF shipping casks are transferred from railcars onto heavy-haul tractor/trailers (as would be the case if an ITF is constructed near Timpie, Utah; see Chapter 2 of this FEIS), then additional dose calculations would apply. This subsection describes such calculations.

Timpie, Utah, is the proposed location on the Union Pacific rail line at which the intermodal transfer of casks from rail to tractor/trailer would take place. A new rail siding and cask handling equipment would be available at the Timpie ITF. The transfer activities that are expected to take place include radiation monitoring during the transfer, release of the shipping canister tiedowns from the railcar, hoisting the cask off of the railcar with a crane and moving it to a heavy-haul trailer, and re-securing the cask to the trailer.

At Timpie, the crew is assumed to consist of four handlers and a spotter, two inspectors, a crane operator and a health physicist. The handlers would attach lifting and rigging equipment to the ends of the cask after it is released from the railcar and help guide it into a saddle on the trailer. The spotter would give directions to the crane operator and the handlers. The inspectors would ensure that all written operating procedures are followed. The health physicist would monitor the movement and check the cask surface for radiation levels.

An equation for estimating the dose received by workers who interact with the SNF canister during the transportation transfer link is built into the RADTRAN4 code, and is described in the documentation (Neuhauser and Weiner 1992) where it is applied to the process of intermodal transfer of SNF shipping casks from one vehicle mode to another a (ship to a truck). The equation is as follows:

$$D = [(K \times DR \times PPS)/r] \times [T_H \times PPH \times N_H \times SPY] \qquad \text{Eq. D.3}$$

where,

D	=	dose in person-mrem
K	=	line source coefficient = $(1+d_{eff}/2)$
d_{eff}	=	the effective shipping cask dimension, in meters [= 4.68 m (15.4 ft) for this calculation]
DR	=	dose rate in mrem/hr at 1 m from the shipping cask surface [= 0.13 mSv/h (13 mrem/h)] for this calculation
PPS	=	shipping casks per shipment (= 4 for this calculation)
T_H	=	exposure time, in hours
PPH	=	number of staff personnel
N_H	=	number of handlings per shipment
SPY	=	number of shipments (= 1 for this calculation), and
r	=	distance of handler from the source, in meters

Each of the four handlers would be expected to spend an average of 15 minutes at a distance of approximately 1 m (3 ft) from the cask before and/or during the transfer of each cask. The health physicist would be expected to average about 5 minutes also at a distance of 1 m (3 ft) from the cask. Each inspector would be expected to spend around 5 minutes within 2 m (6.6 ft) of the cask. A spotter would be expected to remain about 2 m (6.6 ft) away from the cask for a period of 15 minutes. The crane operator may spend 30 minutes in his cab while handling each cask; his cab would be located about 6 m (20 ft) from the cask.

Apart from the time these team members would be physically helping with the cask transfer, they are expected to retreat to an area some distance from the cask where the dose rate is negligible. As the team gets more experienced in the transfer operations, it would be expected that the dose rate received by the various intermodal transfer personnel would be reduced from what is calculated below using Eq. D.3.

Table D.6 shows the estimated doses to the handlers, the spotter, the health physicist, crane operator, and the inspector associated with the unloading of four casks from a single train. The last column in the table indicates the estimated doses for all 50 trains expected in a 1-year period. For comparison, the allowable annual occupational whole-body dose for any one person in restricted-access areas, as cited in 10 CFR 20.1202(1)(i), is 50 mSv/yr (5,000 mrem/yr).

If the ITF is built at Timpie, it is assumed it will include concrete shadow shields strategically placed to shield the unloading crew as well as any member of the public that might drive close to the facility when spent fuel casks are present, awaiting transfer to a trailer and movement to the PFSF.

D.1.5.2 Intermodal Transfers from Reactor Sites Without Rail Access

Some NRC-licensed reactors do not have direct rail access. If the licensees of those reactors were to transport spent fuel for storage at the proposed PFSF, they may decide to transfer the spent fuel casks by barge or heavy haul truck (HHT) a short distance (relative to the overall route length) to the nearest railhead for loading onto railcars. The shipment would continue from that location via dedicated train.

Table D.6. Estimated one-year doses to intermodal transfer personnel

Personnel	Number of people	Distance from source [meters (ft)]	Exposure time (hours)	Dose per train, person-mSv, (person-mrem)	Dose per year, person-mSv, (person-mrem)
Handlers	4	1 (3)	0.25	1.74 (174)	87.0 (8,700)
Spotter	1	2 (6)	0.25	0.22 (22)	11.0 (1,100)
Inspectors	2	2 (6)	0.083	0.14 (14)	7.0 (700)
Health physicist	1	1 (3)	0.083	0.14 (14)	7.0 (700)
Crane operator	1	6 (18)	0.5	0.14 (14)	7.0 (700)
Total				2.38 (238)	119 (11,900)

The representative route from Maine Yankee (MY) to PFSF is intended to adequately characterize risks of shipments, regardless of their use of intermodal transfer. Therefore, the specifics of which reactors would utilize an intermodal option are not material to the FEIS conclusions. To evaluate if the impacts of such activities are reflected by the MY to PFS representative route, the NRC staff has reviewed two example cases:

1. Shipment via HHT from the Salem power plant in New Jersey to a railhead that is 24 km (15 miles) northeast of the plant, then shipment by dedicated train from there to the ITF in Timpie; and
2. Shipment via barge from the St. Lucie power plant, by two routes: either 140 km to Ft. Lauderdale, FL, or 3185 km to St. Louis, Missouri, then shipment by dedicated train from there to the ITF in Timpie.

The results from the INTERLINE and RADTRAN codes were used to compare each of these intermodal routes to the MY to PFS representative route. Because all the routes being compared will always share the route segment from the ITF in Timpie to the PFSF, this segment of the route was neglected to simplify the presentation of the comparisons (the risks of the options for transport from the ITF to PFSF are the same for all cases). Both worker and public, incident-free and accident, radiological risks were considered.

The St. Lucie and Salem plants were selected solely as examples. The licensees of these plants may or may not decide to ship their spent fuel to PFS for storage, and they may use intermodal options and routes different than those analyzed by NRC in this EIS. The NRC staff selected these intermodal options and routes using its professional judgment and the INTERLINE routing code, in consideration of the combination of route length and population density for the intermodal segment of these shipments. As a result, the staff believes the routes selected represent conservative benchmarks for comparison purposes.

Two potential barge routes from the St. Lucie plant are considered in this FEIS. The first proceeds via the St. Lucie Canal to Florida's west coast, across the Gulf of Mexico, and up the Mississippi River to a railhead in St. Louis. It is the route selected by the INTERLINE code and represents a very long barge route traveling through lower population density areas. The second route proceeds down the intercoastal waterway in Florida to a railhead in Ft. Lauderdale. This route was examined by DOE in the DEIS for the proposed high-level waste repository at Yucca Mt., Nevada. It is a long route compared to other plants that might use barge, and it travels through high population density areas for a large fraction of its length.

Incident-free doses. The incident-free radiological impacts include the dose to the crew and public during the HHT or barge movement, to workers and handlers while transferring the cask at the railhead, and to the crew and public during the rail transport segment. The total doses calculated for the intermodal example routes are compared to the total incident free doses calculated for the MY to Timpie representative route. Due to separation distance, this analysis assumes doses to the public while transferring modes at the railhead are negligible.

Because there is no expected difference in the significant parameters describing an intermodal transfer from a heavy-haul truck or barge to a rail car and a transfer from a rail car to a heavy-haul truck at the ITF, results calculated for the ITF transfer (0.12 person-Sv for 200 cask transfers in 1 year) were applied to the transfers near the nuclear plant shipment origin. Table D.6 in Section D.1.5.1 describes the derivation of this dose.

Table D.7 reports the RADTRAN incident-free results for transport of 200 casks using the various intermodal options, the MY to Timpie ITF representative route by rail, and the Timpie ITF to PFS route via HHT southward on Skull Valley Road (the latter two are also presented in Tables 5.15 and 5.16, respectively). Although no single reactor is likely to ship 200 casks in one year, these results are presented in the same format as the Maine Yankee values for ease of comparison to the representative route (i.e., Maine Yankee to PFSF) results. Thus, the tables show results 'scaled' to 200 casks per year by multiplying per cask dose by 200.

The relatively small crew doses for barge transport listed in Table D.7 reflect very limited exposure of the crew to the casks (resulting from one 1-minute inspection per cask per day). The doses to the heavy-haul truck driver and the escorts were calculated in the same manner as for the ITF to PFSF route. The values in the table for near-reactor intermodal operations may be compared to those for the ITF to PSFS route, showing that the crew doses are somewhat smaller while the public doses are higher. The higher public doses are to be expected because of the much higher population densities along these routes compared to Skull Valley Road.

A comparison of the total Salem to Timpie and St. Lucie to Timpie entries in Table D.7, to the Maine Yankee to Timpie entry shows that the incident-free dose estimates for 200 casks are higher for the reactor sites using intermodal transfers. However, the dose estimates do not differ greatly and are all still less than NUREG-0170 levels discussed in Sections 5.7.2.1 and 5.7.2.3 and Table 5.5 of this FEIS. Based on nationwide reactor locations and rail access distance to the PFSF, most routes to the PFSF would have lower risks than the MY to PFSF representative route; some routes could have higher risks such as the examples selected here (to be conservative, the staff intentionally selected examples with high combinations of route length and population density).

Table D.7. Incident-Free dose comparison of intermodal examples and Maine Yankee to PFS route

Route information			Incident-free doses for 200 casks shipped, person-Sv		
Origin/destination	**Length, km**	**Population**	**Public**	**Crew**	**Total**
Salem to Salem Railhead (Heavy Haul Truck)	24	6.9×10^{3}	1.9×10^{-2}	3.1×10^{-3}	2.2×10^{-2}
Intermodal transfer to railcar	N/A	Crew of 9	0	0.12	0.12
Salem Railhead to Timpie (Rail)	3907	2.0×10^{6}	9.0×10^{-2}	1.1×10^{-2}	0.10
Total Salem to Timpie	**3931**	$\mathbf{2.0 \times 10^{6}}$	**0.11**	**0.13**	**0.24**
St. Lucie to St. Louis (Barge)	3185	2.6×10^{5}	0.40	6.8×10^{-3}	0.41
Intermodal transfer to railcar	N/A	Crew of 9	0	0.12	0.12
St. Louis to Timpie (Rail)	2350	3.5×10^{5}	2.1×10^{-2}	8.9×10^{-3}	3.0×10^{-2}
Total St. Lucie to Timpie via barge to St Louis	**5535**	$\mathbf{6.1 \times 10^{5}}$	**0.42**	**0.14**	**0.56**
St. Lucie to Ft. Lauderdale (Barge)	140	2.6×10^{5}	0.24	6.7×10^{-4}	0.24
Intermodal transfer to railcar	N/A	Crew of 9	0	0.12	0.12
Ft. Lauderdale to Timpie (Rail)	4580	1.1×10^{6}	7.7×10^{-2}	1.2×10^{-2}	8.9×10^{-2}
Total St. Lucie to Timpie via barge to Ft. Lauderdale	**4720**	$\mathbf{1.4 \times 10^{6}}$	**0.32**	**0.13**	**0.45**
Maine Yankee to Timpie (Rail)	4383	1.8×10^{6}	9.2×10^{-2}	1.2×10^{-2}	**0.10**
Timpie to PFSF (Heavy Haul Truck) (common to all options)	42	1.1×10^{2}	2.0×10^{-3}	0.13	**0.13**

The NRC staff believes that the MY to PFSF route, as used in this FEIS, is representative and conservatively bounds the nationwide incident-free transportation risks, because the staff considered all 4000 casks to be stored at PFS as originating at Maine Yankee, a long route with high population. For perspective, Table J-6 of the DEIS for Yucca Mountain [DOE 1999] estimates that the total current plus projected (i.e., until end of operations) spent fuel for Salem Units 1 and 2 could be transported in 304 21-PWR assembly rail casks (the system required by the PFSF holds 24 PWR assemblies, see Table 2.5 of this FEIS). Similarly, DOE estimated that the St. Lucie Unit 2 plant's total current plus projected spent fuel could be transported in 140 21-PWR-assembly rail casks. The Yucca Mountain

DEIS evaluates St. Lucie Unit 2, and not St. Lucie Unit 1, because DOE stated that St. Lucie Unit 1 would use truck casks, meaning the system that is required by PFS would not be an option for it.

To represent and conservatively characterize transport risk, this FEIS assumes 4000 casks travel on the same MY to PFSF rail route and concludes that the resultant nationwide incident-free transportation risk impacts are small. In looking at whether or not the MY to PFSF route also adequately represents near-reactor intermodal operations, the NRC staff has considered: (1) the magnitude of the differences in dose estimates between the MY to PFSF route and routes that might include near-reactor intermodal options, and (2) the number of shipments that could be expected to originate from any given plant. The NRC staff concludes that the MY to PFSF representative rail route, as used in the FEIS, conservatively characterizes the nationwide incident-free transportation risks of the proposed action, including potential intermodal transfers.

Accident impacts. The accident radiological impacts consider accidents that might occur during the HHT or barge transportation segment and accidents that might occur during the rail transport segment. The accident dose risk calculated for the intermodal example routes are compared to the accident dose risk calculated for the MY to Timpie representative route. Accidents at the intermodal transfer point could not reasonably be expected to be more challenging to casks than the 10 CFR Part 71 certification tests (e.g., casks would not be lifted more than 9 m (30 ft)); therefore, accidents at the ITF leading to release are considered remote and speculative events. Because non-radiological accident impacts would not be substantially different for different modes of transport, only radiological impacts are considered when comparing the intermodal examples to the MY to PFS representative route.

For the HHT transport from the Salem nuclear plant to Salem, NJ, the same parameters were used as for the ITF to PFSF calculation except for the route-specific values (length, population density, etc.). For barge transport from the St. Lucie plant to Ft. Lauderdale, Florida, or St. Louis Missouri, an accident rate of 0.53 per million shipment kilometers (Saricks and Tompkins 1999, Table 8b) was used with other parameters calculated by INTERLINE to characterize the routes. Note that this accident rate is approximately one tenth of that used in NUREG-0170, which was based on much less specific data. In addition, a set of conditional accident probabilities (i.e., severity fractions), developed for the Yucca Mountain DEIS (see DOE 1999; Table J-31) to correlate with the same set of release fractions described in Table D.4, was used.

The accident dose risks calculated using RADTRAN4 for these routes are presented in Table D.8. These values are substantially higher than those for the Skull Valley route (e.g. 0.000011 person-Sv for 200 shipments in 1 year) due to the much higher population densities neighboring these route segments.

The risk estimate for any individual shipment (200 cask values in the tables divided by 50, for 4 casks per shipment) is higher for the cases requiring intermodal transport at the point of origin. However, the accident risk is lower than the value estimated by in NUREG-0170, (see Table 5.7 of this EIS).

Table D.8 Accident risk comparison of intermodal examples and Maine Yankee to PFS route

Route information			Accident risk for 200 casks shipped
Origin/destination	**Length, km**	**Population (Upper Bound)**	**LCF***
Salem to Salem Railhead (Heavy Haul Truck)	24	3.1×10^6	5.0×10^{-5}
Intermodal transfer to railcar	N/A	Crew of 9	0
Salem Railhead to Timpie (Rail)	3907	4.3×10^6	2.4×10^{-3}
Total Salem to Timpie	**3931**	$\mathbf{7.4 \times 10^6}$	$\mathbf{2.5 \times 10^{-3}}$
St. Lucie to St. Louis (Barge)	3185	4.3×10^6	4.6×10^{-2}
Intermodal transfer to railcar	N/A	Crew of 9	0
St. Louis to Timpie (Rail)	2350	3.9×10^6	4.8×10^{-4}
Total St. Lucie to Timpie via barge to St Louis	**5535**	$\mathbf{8.2 \times 10^6}$	$\mathbf{4.6 \times 10^{-2}}$
St. Lucie to Ft. Lauderdale (Barge)	140	4.3×10^6	3.9×10^{-2}
Intermodal transfer to railcar	N/A	Crew of 9	0
Ft. Lauderdale to Timpie (Rail)	4580	3.8×10^6	1.6×10^{-3}
Total St. Lucie to Timpie via barge to Ft. Lauderdale	**4720**	$\mathbf{8.1 \times 10^6}$	$\mathbf{4.1 \times 10^{-2}}$
Maine Yankee to Timpie (Rail)	4383	4.4×10^6	4.4×10^6
Timpie to PSFS (Heavy Haul Truck) (common to all options)	42	2.3×10^3	4.4×10^{-7}

* *Note:* for an explanation of the numerical LCF values, please refer to the dialogue box in Section 5.7.2

To represent and conservatively characterize transport risk, this FEIS assumes 4000 casks travel on the same MY to PFSF rail route and concludes that the resultant nationwide accident transportation risk impacts are small. In looking at whether or not the MY to PFSF route also adequately represents near-reactor intermodal operations, the NRC staff has considered: (1) the magnitude of the differences in dose estimates between the MY to PFSF route and routes that might include near-reactor intermodal options, and (2) the number of shipments that could be expected to originate from any given plant. NUREG/CR-6672 shows that the urban, suburban, and rural route fractions and population densities for the MY-PFS route are very close to the means of the distributions of these parameters constructed for NUREG/CR-6672. Therefore, since this route is 4489 km long while the mean of the NUREG/CR-6672 route length distribution is 2560 km, risks calculated using the MY-PFS are conservative. Accordingly, the NRC staff concludes that the MY to PFSF representative rail route, as used in the FEIS, conservatively characterizes the nationwide accident transportation risks of the proposed action, including potential intermodal transfers.

D.2 Summary of NUREG-0170

NUREG-0170 (NRC 1977) examined impacts from transporting all licensed material by land, air, and sea transport modes under both incident-free and accident conditions. One of the radioactive materials examined by NUREG-0170 was SNF. For SNF shipments that occur without accidents (incident-free transport), radiation doses were estimated for members of the general public who would be exposed to radiation, for example, because they lived near the shipment route, and also for workers (e.g., crew, handlers, inspectors). Release of radioactive materials from SNF to the environment as a result of transportation accidents, the probability of these releases, and the LCFs that such releases might cause were also estimated. For NUREG-0170, SNF transport risks were estimated for shipment by truck and by train over a generic highway and a generic rail route. Table 5.8 in Chapter 5 of this FEIS shows the NUREG-0170 generic rail route information.

NUREG-0170 contains an assessment of SNF shipment risk using the 1975 level of shipments, and a projection of risks for 1985, based on the assumption of a reprocessing fuel cycle. Sandia National Laboratories conducted the risk assessment for NRC, and developed the original RADTRAN (RADTRAN 1) radioactive material transport risk code, to perform the related dose calculations.

Considering the information developed and received during development of NUREG-0170, and the safety record associated with the transportation of radioactive material, the Commission determined that the regulations then in place (which for spent fuel packaging are very similar to today's regulations) were adequate to protect the public against unreasonable risk from the transport of radioactive materials, and that no immediate changes in the regulations were needed to improve safety (46 *Fed. Reg.* 21619).

For accidents, NUREG-0170 considered two release models, Model I and Model II. For calculations of radiological consequences that might be caused by accidents, accidents were divided into eight categories (Categories I through VIII) of increasing severity. Because little information relating the response of shipping casks to accident environments (NRC 1977) was available in 1975 for SNF and other highly radioactive materials shipped in Type B casks, release of radioactivity as a result of accidents was examined using two release models. Model I assumed that zero release occurs up to the regulatory test level and that the packaging fails catastrophically in all environments that exceed that level (NRC 1977). Each radionuclide was assumed to be released to the environment by this "catastrophic" failure; thus, Model I assumed that the radioactive release would take place whenever a Type B shipping cask was subjected to mechanical or thermal loads in excess of the mechanical and thermal loads encountered during shipping cask certification tests (see 10 CFR 71.73). Because the Model I cask release behavior was considered to be unrealistic (shipping casks would yield gradually, and they generally would not fail catastrophically), a second release model (Model II) was formulated. In Model II, for accidents that exceed the regulatory test level, release fractions increased more gradually with accident severity, eventually becoming equal to Model I for the last three accident severity levels.

D.3 Regional Transportation Risks Near Skull Valley, Utah

This section discusses the projected radiation dose from transporting the SNF casks to the proposed PFSF in Skull Valley using identified rail access routes and the average population densities along those routes. The results from the radiological transportation risk assessment include the radiological impacts to the general population, workers, and a hypothetical maximum exposed individual (MEI) with emphasis on the Salt Lake City and Skull Valley region. The results are also presented in terms of LCFs.

The transportation risk assessment was performed using the INTERLINE routing code and the RADTRAN4 risk assessment code to determine the cumulative transportation impacts in Utah and neighboring states associated with the transport of commercial SNF. The impacts considered were the human health effects associated both with normal transport (incident-free) and with potential accidents severe enough to release radioactive material.

Because of the size and weight of the SNF shipping casks included in the PFS application for a license, shipment by rail is the only viable cross-country transportation option. Therefore, the focus of the analysis below is on rail transportation.

D.3.1 Identification of Routes

The INTERLINE computer code model was used to select routes and analyze the transportation scenarios (see Appendix C of this FEIS). For the purpose of this analysis, it is assumed that all SNF transported to the proposed PFSF in Skull Valley, Utah, will be shipped by rail. While shipment of SNF by truck over highways is possible, the size of the proposed shipping cask system to be used for the proposed PFSF makes the use of rail transportation essential for the transport of SNF. Only when the shipments approach the proposed PFSF (e.g., at Timpie, UT), would transport by truck (i.e., heavy-haul vehicle) for the remaining short distance become viable.

Currently, there is no direct rail access to the proposed PFSF in Skull Valley. This analysis assumes that a new 51-km (32-mile) rail line would be constructed from Skunk Ridge (located northeast of the Low passing siding) to the proposed PFSF site (see Chapter 2 of this FEIS). The Union Pacific Railroad owns the existing rail line at Skunk Ridge. Rail access routes and route lengths were selected as discussed in Appendix C of this FEIS.

D.3.1.1 Shipment Modes and Destinations

Rail shipments through Skull Valley. Although shipments are expected to be made to the proposed PFSF by rail, no rail connection currently exists at the main Union Pacific trackage that passes north of the Reservation. One shipping scenario is that a rail line would be extended from a junction at Skunk Ridge to the proposed PFSF. Once the new rail line is constructed, the expected operation of the transportation system would be to bring the cask-carrying railcars by the Union Pacific system to the new Skunk Ridge siding and to then couple the railcars (with the SNF shipping casks) to dedicated locomotives that would haul the casks to the proposed PFSF. The transport workers would park the cask cars and uncouple them from the locomotive on the rail siding. PFSF workers would take several minutes to couple their locomotive to the cask cars, inspect the cars for any defects, test brake line pressure, and travel down the 51-km (32-mile) line to the proposed PFSF.

There are five possible rail routes within a 250-mile radius of the PFSF that could bring SNF shipping canisters to the Skunk Ridge siding area. As discussed in Appendix C, they include as starting points Black Rock, UT, Carlin, NV, Granger, WY, Green River, UT, and Pocatello, ID. Because it is difficult to tell at this time how much SNF each reactor would transfer to the proposed PFSF and which routes they might use, it was assumed that all 200 cask shipments each year move along each of the routes that have been identified. This assumption provides a conservative, upper-bound result for the exposure of the population along each route. Because each route is expected to carry only some of the total number of shipments, the actual exposures should be considerably less than the exposures computed along any of the routes shown. The results of the RADTRAN4 computer runs for these shipments are discussed below. The exposure data are presented in Table D.9.

Truck shipments through Skull Valley. If the new rail line is not built from Skunk Ridge, the Timpie siding is the proposed location on the Union Pacific rail line at which an ITF would be built. The ITF is the facility at which the transfer of SNF shipping casks from rail to heavy haul truck would take place. The casks would have to be moved the last 41 km (26 miles) to the proposed PFSF by HHT. A rail siding and cask handling equipment would be available at the ITF site. It is anticipated that four casks would come to the ITF each week, 50 weeks a year. One of the casks would be off-loaded from its railcar and would be placed on a heavy-haul trailer for truck transportation to the proposed PFSF (see Chapter 2 of this FEIS). The other three casks would remain on the railcars stopped on the rail siding awaiting transfer to the HHT and transportation to the PFSF.

The cask transfer activities that are expected to take place at the ITF include radiation monitoring during the cask transfer, release of the shipping canister tiedowns from the railcar, hoisting the cask off of the railcar with a crane and moving it to the heavy-haul trailer, and re-securing the cask to the trailer. Transfers would be made only during daylight hours.

At the ITF, the crew is assumed to consist of four handlers and a spotter, two inspectors, a crane operator and a health physicist. The handlers would attach ropes to the ends of the cask after it is released from the railcar and help guide it into a tie-down cradle on the low-boy trailer or to the temporary storage location. The spotter would give directions to the crane operator and the handlers. The inspectors would ensure that all written procedures are followed. The health physicist would monitor the movement and check the cask surfaces. The equation for estimating the dose received by the ITF crew is built into the RADTRAN4 code and has been used to estimate the dose received by handlers and inspectors in an intermodal transfer of SNF shipping casks (Neuhauser and Weiner 1992). Using similar exposure times, the total dose received by the ITF staff is 0.119 person-Sv/yr (11.9 person-rem/yr), or 2.38 person-Sv (238 person-rem) over a 20-year period of shipping SNF to Skull Valley.

Each heavy haul truck shipment to the PFSF from the ITF would be accompanied by escorts: one in front and one at the rear of the heavy-haul tractor/trailer in accordance with Utah Department of Transportation Regulations for Legal and Permitted Vehicles, Section 600. The heavy-haul tractor/trailer would be expected to travel at a speed of about 32 km/hr (20 mph) over the 41 km (26-mile) road to the PFSF. The trip would take approximately 1.5 hours. It is anticipated that the two escort vehicles will travel up to 300 m (1,000 ft) ahead of and behind the heavy-haul tractor/trailer to warn travelers of the slow moving truck. Once unloaded, the heavy-haul tractor/trailer and escorts can return to the ITF and pick up the next cask.

Table D.9. Summary of doses shipped to the proposed PFSF by rail via the proposed Skunk Ridge siding

To PFSF from:	Annual dose, 200 casks per year				20 year life campaign[a]			
	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]	MEI, [Sv (rem)]	Accident pop. dose[b] [person-Sv (person-rem)]	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]	MEI, [Sv (rem)]	Accident pop. dose[b] [person-Sv (person-rem)]
Black Rock, UT	0.00412 (0.412)	0.00091 (0.091)	1.11×10^{-6} (1.11×10^{-4})	0.000188 (0.0188)	0.0824 (8.24)	0.0182 (1.82)	2.22×10^{-5} (2.22×10^{-3})	0.00376 (0.376)
Carlin, NV	0.0041 (0.41)	0.000624 (0.0624)	1.11×10^{-6} (1.11×10^{-4})	0.000113 (0.0113)	0.0820 (8.20	0.0125 (1.25)	2.22×10^{-5} (2.22×10^{-3})	0.00226 (0.226)
Granger, WY	0.00590 (0.590)	0.00520 (0.520)	1.11×10^{-6} (1.11×10^{-4})	0.00237 (0.237)	0.118 (11.8)	0.104 (10.4)	2.22×10^{-5} (2.22×10^{-3})	0.0474 (4.74)
Green River, UT	0.00594 (0.594)	0.00619 (0.619)	1.11×10^{-6} (1.11×10^{-4})	0.00222 (0.222)	0.119 (11.9)	0.124 (12.4)	2.22×10^{-5} (2.22×10^{-3})	0.0444 (4.44)
Pocatello, ID	0.00588 (0.588)	0.00564 (0.564)	1.11×10^{-6} (1.11×10^{-4})	0.00233 (0.233)	0.118 (11.8)	0.113 (11.3)	2.22×10^{-5} (2.22×10^{-3})	0.04665 (4.665)

[a]Assumes all 4,000 casks shipped over the entire campaign are transferred over each of the five rail segments identified.
[b]Upper bound and assumes that all four casks all release the same amount of activity in an accident. A more likely scenario is for only one cask to release activity in a severe accident, in which case the dose received by the population in an accident would be lower by a factor of approximately 3.58.

Assuming there would be one driver in the tractor/trailer and the dose rate in the cab is at the maximum U.S. DOT limit of 0.02 Sv/hr (2 mrem/hr), the dose to the driver would not exceed 0.026 mSv (2.6 mrem) for each trip. In fact, with a single tractor/trailer designed to make this drive on a continuing basis, it would be easy to provide some small amount of additional radiation shielding for the driver, thereby reducing the driver's dose to a fraction of this amount. The PFSF driver(s) would make 200 such shipments each year. The total accumulated dose to the drivers of the tractor/trailer would not exceed:

$$(200 \text{ shipments/yr}) \times (0.026 \text{ mSv/shipment}) = 5.2 \text{ mSv/yr } (520 \text{ mrem/yr}).$$

This translates to a maximum cumulative dose of 0.104 person-Sv (10.4 person-rem) for 4,000 casks shipped over a 20-year period.

Escorts. If the escorts drive an average of 240 m (800 ft) in front of and behind the shipping cask on the heavy-haul tractor/trailer, the dose rate in their vehicles, assuming no intermediate shielding such as the body of the vehicles they are riding in or the cab of the heavy haul tractor/trailer, should not exceed 2×10^{-6} mSv/hr (0.0002 mrem/hr) (see Figure D.2). If there are two escorts in each vehicle, the four escorts would receive:

$$(200 \text{ shipments/yr}) \times (4 \text{ persons/shipment}) \times [2 \times 10^{-6} \text{ mSv } (0.0002 \text{ mrem/hr}) \text{ per person}]$$
$$\times (1.5 \text{ hr/shipment}) = 0.0024 \text{ person-mSv/yr } (0.24 \text{ person-mrem/yr}).$$

This translates to a maximum cumulative dose of 0.048 person-mSv (4.8 person-mrem) to the escorts for the entire 4,000 cask shipping campaign over 20 years.

The results of the RADTRAN4 computer runs for these intermodal shipments are discussed below, and the exposure data are presented in Tables D.10 and D.11.

D.3.1.2 Regional Radiological Impacts

The RADTRAN4 computer code (Neuhauser 1984, 1992) was used to model both the incident-free radiological exposure and the consequences of radiological releases due to severe accidents. For the regional impacts, this assessment uses the same approach as described above for the nationwide analyses.

Table D.9 summarizes the annual and the 20-year campaign radiation dose received by the crew and the public during the rail shipments from the five locations identified for the proposed PFSF in Skull Valley, assuming a new rail line is built from Skunk Ridge to the proposed PFSF. The lower exposure values received by the public when the shipments arrive via the Black Rock and Carlin locations reflect the low population densities around those rail lines compared to the higher population densities around the rail lines that reach the proposed PFSF from the Granger, Green River, and Pocatello locations.

Table D.10. Summary of annual doses shipped to the PFSF via the Timpie siding

To PFSF via Timpie, from:	Rail, annual dose[c]		Annual crew transfer dose, [person-Sv (person-rem)]	Truck, annual dose		Total annual dose	
	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]		Crew dose[a], [person-Sv (person-rem)]	Pop. dose[b], [person-Sv (person-rem)]	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]
Black Rock, UT	0.00398 (0.398)	0.00086 (0.086)	0.119 (11.9)	0.00524 (0.524)	0.00254 (0.254)	0.1282 (12.82)	0.0034 (0.34)
Carlin, NV	0.00408 (0.408)	0.00062 (0.062)	0.119 (11.9)	0.00524 (0.524)	0.00254 (0.254)	0.1283 (12.83)	0.0032 (0.32)
Granger, WY	0.00576 (0.576)	0.00515 (0.515)	0.119 (11.9)	0.00524 (0.524)	0.00254 (0.254)	0.1300 (13.00)	0.0077 (0.77)
Green River, UT	0.00580 (0.580)	0.00580 (0.580)	0.119 (11.9)	0.00524 (0.524)	0.00254 (0.254)	0.1300 (13.00)	0.0083 (0.83)
Pocatello, ID	0.00574 (0.574)	0.00556 (0.556)	0.119 (11.9)	0.00524 (0.524)	0.00254 (0.254)	0.1300 (13.00)	0.0081 (0.81)

[a]Driver plus escorts.
[b]Essentially 100 percent of this population dose is received by persons who are on-link in cars passing the truck carrying the cask.
[c]Assumes all 200 casks are shipped annually.

Table D.11. Summary of 20-year campaign doses shipped to the PFSF via the ITF near Timpie

To PFSF via Timpie, from:	Rail, 20 year campaign[c]		Crew transfer dose, 20-year [person-Sv (person-rem)]	Truck, 20 year campaign		Total dose, 20 year campaign	
	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]		Crew dose[a], [person-Sv (person-rem)]	Pop. dose[b], [person-Sv (person-rem)]	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]
Black Rock, UT	0.0796 (7.96)	0.0172 (1.72)	2.38 (238)	0.105 (10.5)	0.0510 (5.10)	2.564 (256.4)	0.068 (6.8)
Carlin, NV	0.0816 (8.16)	0.0125 (1.25)	2.38 (238)	0.105 (10.5)	0.0510 (5.10)	2.566 (256.6)	0.063 (6.3)
Granger, WY	0.115 (11.5)	0.103 (10.3)	2.38 (238)	0.105 (10.5)	0.0510 (5.10)	2.600 (260.0)	0.154 (15.4)
Green River, UT	0.116 (11.6)	0.116 (11.6)	2.38 (238)	0.105 (10.5)	0.0510 (5.10)	2.601 (260.1)	0.167 (16.7)
Pocatello, ID	0.115 (11.5)	0.111 (11.1)	2.38 (238)	0.105 (10.5)	0.0510 (5.10)	2.600 (260.0)	0.162 (16.2)

[a]Driver plus escorts.
[b]Essentially 100 percent of this population dose is received by persons who are on-link in cars passing the truck carrying the cask.
[c]Assumes all 4,000 casks shipped over the entire campaign are transferred over each of the five rail segments identified.

At the ITF, the casks would be transferred to heavy-haul tractor/trailers and moved to the proposed PFSF. Table D.10 summarizes the annual dose that the crew and the general public would receive. Table D.11 identifies the dose received during a 20-year shipping campaign by the general public and workers, e.g., handlers and inspectors at the ITF, as well as the dose received by the heavy-haul driver(s) and the escorts. The doses received by the different populations (e.g., the crews, including the cask transfer personnel at the ITF, and the general population) are summed in the far right columns of Table D.11. It is apparent from a comparison of Tables D.9 and D.11 that the working crews, particularly those that are involved with the intermodal transfer at the ITF, receive the largest potential dose. However, the dose received by the general population is also higher compared to that received under the Skunk Ridge rail line option, when the casks are shipped to the PFSF using heavy-haul tractor/trailers on Skull Valley Road and the ITF. Table D.13 summarizes the latent cancer fatality (LCF) risk that the crew and the general public would receive, and Table D.14 presents similar information, including the risks associated with the ITF option.

D.3.2 Shipments to a Final Repository

This section examines the radiological risk of transporting all 4,000 SNF canisters from the proposed PFSF to the Utah-Nevada border. The SNF would remain at the proposed PFSF for a number of years, after which it would be removed and transported to the final repository. The NRC staff performed an additional assessment of shipment of SNF from the proposed PFSF to a permanent repository. Congress, in the Nuclear Waste Policy Act (NWPA), as amended, had directed the DOE to study one candidate repository, namely a repository proposed at Yucca Mountain, Nevada. To reflect the provisions of the NWPA, the NRC staff has examined the shipment of SNF via rail from the proposed PFSF on its way to a permanent repository in the western United States as if such a repository were located at Yucca Mountain, Nevada, although that location may or may not become the actual repository. Accordingly the NRC staff examined the shipment of SNF via rail from the proposed PFSF through Black Rock, Utah, to the Utah-Nevada border. It should be noted that the NRC has not received an application requesting a license for permanent geologic repository, and the NRC has not made any determination regarding any proposal to construct such a repository at Yucca Mountain, Nevada, or any other location. DOE is not currently considering any other location. However, the NRC staff recognized that Yucca Mountain may not be selected or approved as the final repository, and the assumption made is for analytical purposes in this FEIS. Further, this EIS does not dictate any particular result for future actions taken with respect to other nuclear waste management facilities (including a repository or other storage facility).

The plans beyond the Utah border are subject to decisions that have not yet been made. Accordingly, while the NRC staff's evaluation reflects the provisions of the NWPA, the specifics and details of potential repository location, design, and operations (e.g., use of a direct rail route or an intermodal facility with heavy haul segment) that are not yet certain are not material to the assessments and conclusions in this FEIS.

For the purposes of analysis, it was assumed that the SNF in the canisters would have been cooled at least 20 years prior to shipment to a repository. It was also assumed that the shipping casks designed to bring the canisters to the PFSF would be used to ship them to the repository. These assumptions are judged reasonable because this will (1) save the cost of designing, certifying, and fabricating new casks, (2) reduce potential handling activities, and (3) reduce the dose rate from the casks because of the decay of many of the isotopes that would be inside the canisters. Comparing 5-year-old fuel with 20-year-old fuel with the same burn-up, the radioactivity of the most significant isotopes will be reduced by a factor of two. To a first approximation, the dose rate is assumed to be reduced by this

Table D.12. Summary of doses from the outbound shipments from PFSF to a permanent repository as far as the Utah-Nevada border.[a]

	Annual dose, 200 casks per year[a]				20 year life campaign			
From PFSF to:	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]	MEI, [Sv (rem)]	Accident pop. dose [person-Sv (person-rem)]	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]	MEI, [Sv (rem)]	Accident pop. dose [person-Sv (person-rem)]
Utah-Nevada border	0.00218 (0.218)	0.0008 (0.08)	5.54×10^{-7} (5.54×10^{-5})	0.000223 (0.0223)	0.0436 (4.36)	0.0160 (1.60)	1.11×10^{-5} (1.11×10^{-3})	0.00446 (0.446)

[a]Includes the shipment of 200 casks per year, each containing twenty-four 20-year cooled PWR fuel assemblies, and a dose rate of 0.065 mSv/hr (6.5 mrem/hr) at 1 m (3 ft) from the cask shipped from the PFSF by rail via the Skunk Ridge siding.

Table D.13. Summary of the cumulative annual and 20-year campaign risks for the shipment of spent nuclear fuel by rail via the Skunk Ridge siding to the proposed PFSF site in Skull Valley, Utah

To PFSF from:	Risks (LCFs) from 1 year rail shipments			Risks (LCFs) from 20 years of rail shipments		
	Incident-free risk		Accident risk[a]	Incident-free risk		Accident risk[a]
	Crew	Public	Public	Crew	Public	Public
Black Rock, UT	1.65×10^{-4}	4.55×10^{-5}	9.40×10^{-6}	3.30×10^{-3}	9.10×10^{-4}	1.88×10^{-4}
Carlin, NV	1.64×10^{-4}	3.12×10^{-5}	5.65×10^{-6}	3.28×10^{-3}	6.25×10^{-4}	1.13×10^{-4}
Granger, WY	2.36×10^{-4}	2.60×10^{-4}	1.19×10^{-4}	4.72×10^{-3}	5.20×10^{-3}	2.37×10^{-3}
Green River, UT	2.38×10^{-4}	3.10×10^{-4}	1.11×10^{-4}	4.76×10^{-3}	6.20×10^{-3}	2.22×10^{-3}
Pocatello, ID	2.35×10^{-4}	2.82×10^{-4}	1.17×10^{-4}	4.72×10^{-3}	5.65×10^{-3}	2.33×10^{-3}

[a]Upper bound and assumes that all four casks on a single train all release the same amount of activity in an accident. A more likely scenario is for only one cask to release activity in a severe accident, in which case the dose received by the population in an accident would be lower by a factor of approximately 3.58.

Table D.14. Summary of the cumulative 20-year campaign risks for the intermodal shipment of spent nuclear fuel to the proposed PFSF site via the ITF near Timpie

To PFSF via Timpie, from:	Rail risk (LCFs) incident-free		Transfer risk (LCFs) incident-free	Truck risk (LCFs) incident-free		Total risk (LCFs) incident-free		Accident risk (LCFs)
	Crew	Public	Crew	Crew	Public	Crew	Public	Public
Black Rock, UT	3.18×10^{-3}	8.60×10^{-4}	9.52×10^{-2}	4.19×10^{-3}	2.54×10^{-3}	1.03×10^{-1}	3.40×10^{-3}	1.89×10^{-4}
Carlin, NV	3.26×10^{-3}	6.25×10^{-4}	9.52×10^{-2}	4.19×10^{-3}	2.54×10^{-3}	1.03×10^{-1}	3.15×10^{-3}	1.14×10^{-4}
Granger, WY	4.60×10^{-3}	5.15×10^{-3}	9.52×10^{-2}	4.19×10^{-3}	2.54×10^{-3}	1.04×10^{-1}	7.70×10^{-3}	2.37×10^{-3}
Green River, UT	4.64×10^{-3}	5.80×10^{-3}	9.52×10^{-2}	4.19×10^{-3}	2.54×10^{-3}	1.04×10^{-1}	8.35×10^{-3}	1.77×10^{-3}
Pocatello, ID	4.60×10^{-3}	5.55×10^{-3}	9.52×10^{-2}	4.19×10^{-3}	2.54×10^{-3}	1.04×10^{-1}	8.10×10^{-3}	2.33×10^{-3}

same ratio, i.e., to 0.065 mSv/hr (6.5 mrem/hr) at a distance of 1 m (3.3 ft) from the cask surface. However, the population of Utah is expected to increase about a factor of two from 1990 (at 1.72 million) to 2040 (projected to be 3.38 million).

The doses and risks associated with SNF shipments from the proposed PFSF to the Utah-Nevada border are presented and discussed in detail in Section 5.7.2.7 of this FEIS.

D.4 Regional Transportation Risks Near the Alternate Site for the Facility in Fremont County, Wyoming

An alternative site for the proposed facility near Shoshoni, Wyoming, was also examined for this study (see Chapter 7 in this FEIS). This site is located approximately 3.2 km (2 miles) from the Burlington Northern Santa Fe (BNSF) Railway mainline that runs through central Wyoming.

D.4.1 Identification of Routes

The INTERLINE rail routing model was used to examine possible rail access routes to this alternative site. As with the access routes identified for the Skull Valley site in Utah, the actual distances of the routes to the Wyoming site vary [from about 350 km (220 miles) to 400 km (250 miles)] due to the structure of the INTERLINE rail routing network. Four different access routes could be used to service the alternative site in Wyoming. These rail routes are described and illustrated in Appendix C of this FEIS.

D.4.2 Radiological Impacts

A risk analysis similar to that developed for the Skull Valley site (see Section D.3) was carried out for the alternative Wyoming site, and all available rail routes that could be used to transfer SNF shipping casks to the site were identified as described above. The Wyoming site was assumed to receive approximately 200 casks per year (i.e., the same as the Skull Valley site). The exposure of the public and train crew will be affected by the number of casks that will be handled by any single train. Although the shipments are expected to average four casks per train into the site, each train can be expected to handle anywhere from one to six casks. Table D.3 presents the radionuclide inventory for the SNF shipments to the Wyoming site.

There are four possible rail routes that could bring SNF to the Wyoming site. As discussed in Appendix C of this FEIS, they include as starting points Crandall, WY, Gibson, WY, Mitchell, NE, and Mossmain, MT. Similar to the analysis in Section D.3, it was assumed that all 200 shipments each year move along each of the routes that have been identified. This provides a conservative, upper-bound result for the actual exposure of the population along each route. Because each route is expected to carry only some of the total shipments, the exposures should be considerably less than the exposures computed along any of the routes shown. The results of the RADTRAN4 computer runs are discussed below. The exposure data are presented in Table D.15.

Table D.16 lists the risk of LCFs expected to result from radiation exposure during incident-free transportation and accidents assuming all the shipments come to the Wyoming site on each of the four possible routes. Radiation doses to the population and rail crews were converted to estimates of LCFs using the upper limit risk coefficient suggested by the NAS (ICRP 1991; NAS 1990).

Table D.15. Summary of doses for the shipment of spent nuclear fuel to the Wyoming site by rail

	Annual dose, 200 casks per year				20 year life campaign			
To Wyoming ISFSI from:	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]	MEI, person-[Sv (rem)]	Accident pop. dose [person-Sv (person-rem)]	Crew dose, [person-Sv (person-rem)]	Pop. dose, [person-Sv (person-rem)]	MEI, person-[Sv (rem)]	Accident pop. dose [person-Sv (person-rem)]
Crandall, WY	0.00576 (0.576)	0.00146 (0.146)	1.11×10^{-6} (1.11×10^{-4})	7.19×10^{-4} (7.19×10^{-2})	0.115 (11.5)	0.0292 (2.29)	2.22×10^{-5} (2.22×10^{-3})	0.0144 (1.44)
Gibson, WY	0.00578 (0.578)	0.00153 (0.153)	1.11×10^{-6} (1.11×10^{-4})	7.37×10^{-4} (7.37×10^{-2})	0.116 (11.6)	0.0306 (3.06)	2.22×10^{-5} (2.22×10^{-3})	0.0147 (1.47)
Mitchell, NE	0.00584 (0.584)	0.00159 (0.159)	1.11×10^{-6} (1.11×10^{-4})	7.51×10^{-4} (7.51×10^{-2})	0.117 (11.7)	0.0318 (3.18)	2.22×10^{-5} (2.22×10^{-3})	0.0150 (1.50)
Mossmain, MT	0.00578 (0.578)	0.000884 (0.0884)	1.11×10^{-6} (1.11×10^{-4})	2.56×10^{-4} (2.56×10^{-2})	0.116 (11.6)	0.0177 (1.77)	2.22×10^{-5} (2.22×10^{-3})	0.00512 (0.512)

Table D.16. Summary of the cumulative annual and 20-year campaign risks for the shipment of spent nuclear fuel by rail to the alternative Wyoming ISFSI site

	Risks (LCFs) from 1 year rail shipments			Risks (LCFs) from 20 years of rail shipments		
	Incident-free risk		Accident risk	Incident-free risk		Accident risk
To the Wyoming site from:	Crew	Public	Public	Crew	Public	Public
Crandall, WY	2.30×10^{-4}	7.30×10^{-5}	3.60×10^{-5}	4.61×10^{-3}	1.46×10^{-3}	7.20×10^{-4}
Gibson, WY	2.31×10^{-4}	7.65×10^{-5}	3.69×10^{-5}	4.62×10^{-3}	1.53×10^{-3}	7.38×10^{-4}
Mitchell, NE	2.34×10^{-4}	7.95×10^{-5}	3.76×10^{-5}	4.67×10^{-3}	1.59×10^{-3}	7.52×10^{-4}
Mossmain, MT	2.31×10^{-4}	4.42×10^{-5}	1.28×10^{-5}	4.62×10^{-3}	8.84×10^{-4}	2.56×10^{-4}

Assuming an average of four casks are shipped on each train, this study indicates that the radiological risks of the rail shipments of SNF are quite low. In any year, the number of LCFs statistically expected to occur from the calculated exposures would not exceed 2.34×10^{-4} LCFs for the two person crew or 7.95×10^{-5} LCFs for members of the public exposed during incident-free transportation if all the shipments came through the Mitchell, NE, route. For the entire 20-year campaign, the number of LCFs statistically expected to occur from the calculated exposure data would not exceed 4.67×10^{-3} LCFs for the two-person crew or 1.59×10^{-3} LCFs for members of the public exposed during incident-free transportation if all the shipments came through the Mitchell, NE, route.

The results of the analysis indicate that the radiological risk associated with an accident is maximized on the Mitchell, NE route, but is not expected to exceed 3.76×10^{-5} LCFs in any year and 7.52×10^{-4} LCFs over the life of the campaign. The MEI who witnesses the movement of each of the 50 trains per year, each carrying four casks, at a distance of 30 m (98 ft) from the passing train, would receive 0.0011 mSv (0.11 mrem), which is 0.03 percent of the 3.0 mSv (300-mrem) average annual effective dose received from natural background radiation sources. If the MEI witnessed the movement of casks over the entire 20-year campaign, that individual would not receive a dose in excess of 0.022 mSv (2.2 mrem).

D.5 References

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APPENDIX E

CENSUS BUREAU DATA AS USED IN ENVIRONMENTAL JUSTICE ANALYSES

This appendix displays the data obtained from the U.S. Department of Commerce, Census Bureau, on populations near the proposed site of the spent nuclear fuel storage facility in Skull Valley, Utah.

The staff examined the geographic distribution of minority and low income populations within 80 km (50 miles) of the proposed facility, based on 1990 Census data. The sidebar box below discusses the types of data available from the Census Bureau. The block group data for the region of study around Skull Valley are shown in Table E.1.

Census blocks are the smallest geographic areas recognized by the U.S. Census Bureau that are bounded on all sides by visible features. A geographic **Block Group** is a cluster of blocks having the same first digit of their three-digit identifying numbers within a census tract or block numbering area. Block groups generally contain between 250 and 550 housing units, with the ideal size being 400 housing units. With some exceptions, block groups have the distinction of being the smallest geographic unit for which the U.S. Census Bureau tabulates long form (sample) data on items such as income, occupation, or education.

A block group is a statistical subdivision of a census tract. Geographic block groups never cross census tracts but may cross the boundaries of county subdivisions, places, urbanized areas, voting districts, and so forth. Tabulation block groups may be split to present data for every unique combination of county subdivision, place, and the like.

A hierarchical geographic presentation shows the geographic entities in a superior/subordinate structure in census products. Graphically, this is shown as:

```
United States
  └─Region
      └─Division
          └─State
              └─County
                  └─County subdivision
                      └─Place (or part)
                          └─Census tract/block numbering area (or part)
                              └─Block group (or part)
                                  └─Block
```

Table E.1. Minority and Low Income Block Groups Within 80 km (50 mi) of the Preferred Site on the Reservation of the Skull Valley Band of Goshute Indians.

Table notes: Boldface values are 20 percentage points more than the state average. Italicized values are 10 percentage points more than the state average

County and tract	Block group	Number of persons	Below poverty level (percent)	Total whites (percent)	Black (percent)	Native American (percent)	Asian and Pacific Islander (percent)	Other (percent)	Hispanic (all races) (percent)	Minorities (Racial minorities plus white hispanics) (percent)
State of Utah		1,722,850	11.4	93.9	0.6	1.4	1.9	2.1	**4.8**	**8.7**
Weber										
2104	1	1,019	4.4	98.3	0.0	0.8	0.8	0.1	2.5	5.9
Utah										
0001	1	1,224	1.1	97.7	0.0	0.2	1.4	0.7	2.0	2.8
0001	2	1,714	4.3	97.1	0.1	0.6	1.4	0.8	3.0	4.1
0001	3	586	3.3	99.7	0.0	0.3	0.0	0.0	1.7	2.1
0001	4	782	7.7	97.7	0.0	0.6	0.6	1.0	1.3	2.3
0001	5	1,330	8.4	98.7	0.1	0.8	0.0	0.5	0.9	3.3
0001	6	1,622	3.4	97.2	0.0	0.4	1.5	0.9	1.6	2.8
0001	7	1,148	16.4	97.6	0.3	0.4	0.9	0.8	2.5	3.9
0022	1	1,789	17.9	95.9	0.4	0.6	1.0	2.1	3.7	5.6
0101	1	1,040	2.7	99.5	0.0	0.2	0.2	0.1	1.7	1.1
0101	2	1,452	7.3	96.9	0.0	0.1	1.0	2.0	2.7	3.5
010298	2	5,417	5.3	99.0	0.1	0.2	0.5	0.3	0.7	1.5
0106	1	1,151	19.0	85.8	0.0	1.7	0.3	*12.3*	*16.2*	16.7
Tooele										
1306	1	338	15.0	72.8	0.0	**23.1**	1.8	2.4	6.2	*28.2*
1306	9	1,766	5.9	86.9	7.9	0.5	1.9	2.9	6.3	16.2
1307	1	1,099	4.7	95.8	0.8	2.0	0.1	1.3	3.7	5.1
1307	2	485	20.2	95.3	1.0	2.5	0.0	1.2	5.6	5.7
1307	3	1,057	1.8	94.7	1.2	0.9	1.7	1.5	4.0	8.2
1307	4	1,072	2.7	96.4	0.4	0.4	0.2	2.7	4.9	6.6
1307	5	381	14.5	99.5	0.0	0.5	0.0	0.0	10.5	14.5
1307	6	101	0.0	99.0	0.0	1.0	0.0	0.0	0.0	1.0
1307	7	457	10.0	97.2	0.0	2.8	0.0	0.0	8.3	15.0
1307	8	690	2.5	95.4	0.0	0.4	0.4	3.8	5.5	6.7
1308	1	1,460	10.9	96.0	0.1	2.6	0.1	1.2	3.6	7.7
1308	2	922	17.5	94.4	0.3	0.7	0.4	4.2	6.2	9.4
1308	3	1,490	12.7	97.3	0.0	0.5	0.8	1.4	4.6	9.1
1309	1	972	12.9	92.8	0.2	2.1	0.6	4.3	9.4	11.0
1309	2	1,175	19.4	90.2	0.2	0.9	0.9	7.8	13.9	12.8
1310	1	1,390	8.1	94.8	0.4	1.4	0.4	2.9	13.8	*20.0*
1310	2	541	15.9	94.5	1.3	0.7	1.1	2.4	10.5	10.0
1310	3	797	16.8	89.6	0.8	1.1	1.9	6.6	*16.4*	*20.5*
1310	4	898	*24.7*	86.5	0.3	1.4	0.4	11.2	*16.4*	18.3
1310	5	687	13.8	90.8	0.3	1.0	1.0	6.8	9.8	14.0
1311	1	1,194	16.7	94.4	0.8	2.1	1.1	1.7	11.1	14.7
1311	2	463	20.3	96.3	0.0	0.0	0.9	2.8	6.9	3.7
1311	3	1,124	4.1	95.3	0.0	0.5	1.5	2.7	4.5	6.6
1311	4	1,448	10.0	94.5	0.3	1.5	0.5	3.2	12.7	16.0
1312	1	518	12.7	93.4	0.2	1.4	0.2	4.8	6.9	12.8
1312	2	1,404	4.8	95.6	0.0	0.9	0.6	3.0	13.6	15.7
1312	3	1,184	2.3	96.7	0.6	0.0	1.3	1.4	7.5	7.0

Salt Lake										
100302	1	141	0.0	95.7	2.8	0.7	0.0	0.7	14.2	9.6
100303	1	178	20.2	99.4	0.0	0.0	0.6	0.0	2.2	0.6
1028	4	2,715	16.7	71.1	4.6	1.7	*13.6*	9.0	*17.0*	**37.7**
1115	1	1,356	20.4	89.3	0.7	1.4	3.7	4.9	9.4	15.9
1116	4	715	12.8	90.2	2.0	2.2	3.6	2.0	7.8	11.6
1116	5	674	14.3	87.5	2.2	1.6	3.0	5.6	9.6	15.9
1116	6	1,200	**35.5**	91.3	0.8	1.3	3.3	3.2	7.3	10.8
1121	1	784	*24.7*	94.9	0.3	2.4	1.3	1.1	9.2	*21.3*
1121	2	754	19.7	95.0	1.1	0.9	1.9	1.2	5.7	6.5
1121	3	1,119	8.3	94.4	1.4	0.2	2.6	1.4	4.2	5.6
1121	4	968	14.1	93.4	2.6	0.4	2.2	1.4	4.2	10.2
1121	5	1,888	0.4	96.8	0.9	0.2	1.0	1.1	3.5	6.5
1121	6	1,775	2.2	95.5	0.3	0.2	2.5	1.5	2.9	4.5
112201	1	2,315	9.7	95.6	0.6	0.9	0.6	2.3	5.6	8.2
112201	2	1,748	0.5	95.7	0.2	0.2	1.8	2.1	5.0	7.0
112201	3	602	0.0	96.5	0.2	0.2	0.2	3.0	6.1	5.8
112202	1	1,517	13.5	96.0	0.2	0.5	2.3	1.0	2.8	8.0
112202	2	985	8.2	94.6	0.3	1.6	1.3	2.1	4.7	7.5
112202	3	898	1.8	95.8	0.6	0.6	2.2	0.9	2.8	5.0
112301	3	1,463	1.6	96.2	0.3	0.5	2.5	0.4	2.7	5.9
112302	2	902	5.6	97.0	0.7	0.6	0.7	1.1	3.0	8.1
112302	3	1,981	0.5	97.8	0.3	0.1	1.0	0.9	3.2	2.6
112401	1	1,622	12.8	91.7	0.4	1.2	2.7	4.1	7.0	9.7
112401	2	1,620	14.8	90.4	0.4	0.6	1.3	7.3	12.0	12.8
112401	3	613	13.8	68.2	0.3	2.6	2.9	**25.9**	**37.4**	**50.2**
112401	4	1,657	**36.3**	82.6	0.7	3.2	2.3	11.2	**26.0**	**29.0**
112401	5	995	**52.0**	70.8	1.0	2.9	9.2	*16.1*	**31.9**	**51.6**
112402	1	1,179	7.9	92.8	0.1	0.6	1.3	5.3	12.8	11.1
112402	2	1,016	19.9	93.7	0.0	0.0	4.0	2.3	5.0	6.8
112402	3	2,218	15.8	87.4	0.1	0.2	7.8	4.5	10.1	*18.9*
112402	4	1,065	*25.1*	91.5	0.1	2.3	3.8	2.2	6.4	10.5
112501	2	1,492	1.6	97.5	0.2	0.1	1.4	0.9	3.5	5.9
112501	3	1,360	2.3	95.7	0.1	0.4	2.1	1.7	5.1	5.7
112503	1	978	8.8	94.7	0.7	0.2	0.8	3.6	8.9	9.5
112503	2	1,077	9.7	93.5	0.1	1.3	3.2	1.9	5.7	13.4
112503	3	968	16.2	95.5	0.3	1.3	1.0	1.9	5.1	8.7
112503	4	648	4.8	96.8	0.0	0.0	0.5	2.8	9.0	14.0
112604	1	1,493	10.0	97.3	0.3	0.3	1.6	0.5	3.2	4.1
112604	2	1,649	7.1	97.8	0.2	0.4	0.2	1.3	4.8	7.9
112604	3	1,054	0.9	98.3	0.0	0.0	0.6	1.1	3.0	2.8
112604	4	1,079	7.3	94.1	0.2	1.1	2.2	2.4	4.0	6.4
112605	1	1,563	0.3	96.7	0.2	0.6	2.0	0.5	3.6	5.1
112605	2	931	2.4	95.8	0.0	0.8	1.4	2.0	3.5	4.2
112605	3	1,074	13.0	93.1	0.2	0.3	5.5	0.9	2.8	10.3
112605	4	1,020	20.9	91.1	0.0	1.9	3.8	3.2	7.4	11.9
112610	1	1,122	6.7	95.5	0.4	0.4	2.9	0.8	6.0	10.0
112610	2	1,004	5.7	98.1	0.0	0.3	0.9	0.7	3.7	3.1
112610	3	1,349	7.2	93.7	0.4	0.7	3.3	1.9	4.6	7.7
112611	2	2,327	6.2	96.9	0.3	0.3	1.2	1.2	2.6	5.8
112612	1	1,896	3.0	96.7	0.3	0.3	1.7	0.9	2.2	5.5
112612	2	1,519	4.0	97.0	0.3	0.0	1.6	1.1	3.3	5.5
1127	1	717	1.4	95.8	0.3	0.1	2.6	1.1	5.3	6.3
1127	2	1,015	9.0	97.7	0.2	0.2	0.4	1.5	4.1	3.2
1127	3	1,403	20.9	91.6	0.1	0.6	3.2	4.4	7.5	9.4
1127	4	1,077	11.3	96.9	0.0	0.2	1.1	1.8	4.4	4.5
1127	5	690	5.9	96.8	0.0	0.0	2.0	1.2	4.3	4.8
112801	1	1,294	12.5	95.1	0.1	0.2	4.1	0.5	2.3	5.5
112801	2	1,962	4.7	98.0	0.1	0.3	1.1	0.6	1.1	2.7

112801	3	1,471	10.0	97.6	0.3	0.8	0.5	0.8	2.6	2.4
112801	4	3,311	0.5	82.5	6.6	2.4	1.5	7.0	*14.8*	*25.7*
112801	5	2,042	12.2	99.4	0.0	0.4	0.1	0.0	1.2	1.7
112802	1	1,295	6.1	95.7	0.7	0.0	2.2	1.4	4.1	8.0
112802	2	1,895	11.1	96.7	0.3	0.0	1.3	1.7	3.5	5.9
112802	3	2,609	3.0	94.6	0.0	0.8	3.4	1.2	2.8	8.2
112802	4	1,855	1.8	97.8	0.0	0.0	1.7	0.5	2.0	3.2
112804	1	2,894	2.2	98.2	0.3	0.1	0.7	0.6	2.9	5.1
112804	2	2,835	3.0	97.8	0.3	0.3	1.1	0.5	2.0	2.9
112805	1	2,601	2.6	97.8	0.3	0.2	1.1	0.6	3.0	5.2
112805	2	979	0.0	98.0	0.1	0.4	0.2	1.3	3.2	4.6
112806	6	2,213	0.7	97.8	0.2	0.0	1.9	0.1	2.3	2.6
112904	1	1,199	0.0	93.1	1.7	0.1	2.4	2.8	5.7	8.8
112904	2	1,830	2.6	94.6	0.2	0.3	1.7	3.2	5.4	10.0
112904	3	2,445	5.5	92.3	0.6	0.3	2.3	4.5	9.0	10.6
112905	1	2,132	0.5	95.6	0.7	0.9	1.3	1.5	3.8	7.0
112905	2	1,399	3.8	98.1	0.4	0.1	0.9	0.5	3.1	4.8
112905	3	1,099	6.6	95.3	0.0	1.9	1.6	1.2	2.6	6.7
112906	1	2,770	0.8	95.9	0.2	0.4	0.7	2.8	5.2	4.1
112906	2	2,374	5.2	95.2	0.1	0.1	0.9	3.6	6.2	7.9
112906	3	2,821	4.9	95.0	0.5	0.2	1.7	2.6	6.3	11.2
112907	1	986	3.3	94.7	0.0	0.5	2.5	2.2	5.0	8.5
112907	2	817	0.7	97.1	0.0	0.0	1.2	1.7	6.5	10.6
112907	3	1,390	13.2	89.3	0.0	1.8	3.9	5.0	7.4	11.2
112907	4	1,941	8.5	89.9	0.2	0.9	3.5	5.6	9.2	16.3
112908	1	1,215	2.7	96.2	0.2	0.7	2.0	0.8	3.0	3.8
112908	2	1,991	13.9	92.9	0.3	1.1	2.2	3.5	7.2	9.4
112908	3	560	1.2	95.9	0.0	0.9	0.4	2.9	5.2	12.9
112908	4	1,219	**31.8**	91.4	0.4	0.5	4.4	3.3	9.8	11.8
112908	5	828	8.6	91.8	0.0	0.2	2.9	5.1	11.7	19.4
112909	1	1,081	7.4	91.8	0.2	0.6	0.6	6.9	9.5	8.9
112909	2	2,210	1.7	93.4	0.6	0.5	2.4	3.1	6.3	10.1
112909	3	2,519	11.4	90.1	0.7	1.0	2.1	6.2	10.8	14.2
112910	1	1,127	5.3	95.1	0.5	0.4	2.7	1.2	2.3	5.6
112910	2	1,566	12.0	91.6	0.1	0.8	2.4	5.2	6.6	11.7
112910	3	1,371	4.9	96.4	0.5	0.1	0.4	2.6	6.1	5.3
112911	1	911	3.1	94.1	0.1	0.4	3.3	2.1	6.1	10.6
112911	2	1,477	3.8	98.7	0.2	0.2	0.1	0.7	3.0	1.8
112911	3	1,413	3.1	97.8	0.0	0.0	1.5	0.7	4.0	6.7
113003	1	1,128	2.5	98.1	0.0	0.0	0.6	1.2	2.8	4.9
113003	2	2,552	1.6	96.3	0.1	0.2	1.4	2.0	3.6	4.1
113003	3	959	1.2	99.5	0.0	0.4	0.1	0.0	0.7	0.5
113004	1	1,905	6.3	98.3	0.1	0.1	0.7	0.9	1.9	3.5
113004	2	1,807	3.3	98.1	0.0	0.2	1.4	0.3	1.5	6.2
113004	3	1,752	3.6	97.8	0.1	0.4	0.7	1.0	1.9	2.8
113004	4	1,612	1.1	99.4	0.0	0.1	0.2	0.3	0.7	0.6
113005	1	1,897	0.3	97.8	0.1	0.3	0.7	1.2	4.0	5.4
113005	2	1,463	5.5	97.3	0.0	0.0	1.1	1.6	3.1	3.2
113005	3	1,247	7.2	98.6	0.2	0.1	0.2	0.9	3.7	1.4
113005	4	570	0.9	98.9	0.4	0.0	0.0	0.7	2.3	3.5
113006	1	893	12.7	99.0	0.0	0.0	0.1	0.9	1.5	3.0
113006	2	1,101	3.2	96.4	0.0	0.0	1.0	2.6	3.8	3.6
113006	3	1,565	7.5	99.2	0.0	0.4	0.1	0.3	1.0	0.8
113006	4	1,423	0.9	97.3	0.2	0.2	1.3	1.0	2.2	3.0
113006	5	1,313	3.7	99.5	0.0	0.0	0.1	0.5	2.7	3.8
1131	1	2,465	11.1	93.3	0.1	1.5	2.8	2.3	7.4	9.8
1131	2	1,693	2.5	96.5	0.5	0.3	2.0	0.7	2.5	5.0
1131	3	2,150	8.7	94.3	0.0	1.3	1.8	2.6	5.6	11.5
1131	4	631	5.6	97.0	0.0	0.2	1.6	1.3	7.1	7.1

1131	5	1,233	*24.3*	98.3	0.4	0.5	0.1	0.7	2.6	3.5
113304	1	1,154	7.1	92.8	0.8	0.3	2.0	4.2	8.7	12.3
113304	2	882	**32.0**	87.9	1.2	1.7	2.3	6.9	12.2	14.1
113304	3	835	10.0	96.5	0.4	0.6	1.4	1.1	5.7	3.9
113304	4	1,328	7.9	92.2	0.3	0.2	3.0	4.2	6.9	12.9
113304	5	1,778	**31.5**	84.1	1.3	2.5	7.5	4.6	8.5	*21.1*
113304	6	1,345	7.4	91.7	1.5	1.3	3.7	1.9	4.3	10.3
113305	1	1,397	*23.1*	83.7	3.3	2.3	4.9	5.8	13.1	*21.8*
113305	2	839	13.4	89.6	0.5	5.5	2.6	1.8	5.1	13.9
113305	3	1,174	**53.7**	57.4	0.8	10.7	**26.0**	5.1	7.8	**46.5**
113305	4	1,193	10.8	88.9	1.7	1.7	3.7	4.1	9.6	18.3
113306	1	1,855	*23.0*	85.3	3.3	1.2	5.0	5.2	9.6	*20.6*
113306	2	2,713	9.6	88.8	1.4	0.7	4.7	4.4	6.9	13.4
113307	1	740	15.6	88.4	1.9	2.0	2.6	5.1	7.6	17.0
113307	2	1,469	*21.9*	84.9	0.9	1.6	7.6	5.0	8.2	17.8
113307	3	1,055	9.2	88.7	0.6	0.7	7.8	2.3	7.1	14.8
113307	4	673	7.8	88.3	2.2	0.4	4.6	4.5	9.2	12.8
113308	1	974	*23.6*	83.8	1.4	4.0	3.6	7.2	11.9	*20.9*
113308	2	1,558	20.8	95.5	0.7	0.9	2.3	0.6	5.7	10.0
113308	3	1,263	*25.5*	87.6	0.9	3.4	6.1	2.0	9.5	18.2
113402	1	1,948	1.4	95.5	1.1	0.1	2.1	1.2	4.7	10.6
113402	2	1,315	13.7	91.1	0.4	0.2	4.3	4.0	8.2	10.4
113402	3	1,415	5.8	89.3	0.5	0.6	6.5	3.2	5.2	12.6
113402	4	967	10.1	91.5	0.6	0.9	3.5	3.4	6.7	11.3
113402	5	1,299	1.7	92.1	0.5	0.6	2.3	4.5	6.1	9.2
113403	1	1,102	8.2	86.9	0.2	0.2	10.4	2.3	6.3	14.5
113403	2	1,291	8.6	93.3	1.2	0.2	3.0	2.3	4.8	10.7
113403	3	2,122	2.3	93.9	0.7	0.1	2.7	2.6	6.7	10.1
113403	4	1,406	9.0	95.8	0.4	0.4	1.3	2.1	4.3	5.2
113405	1	2,763	4.7	81.0	1.0	0.8	*13.0*	4.2	7.5	*22.8*
113406	1	1,983	12.8	90.2	1.0	2.0	2.6	4.2	7.4	11.0
113406	2	1,926	21.2	84.5	0.9	1.8	7.9	4.8	8.7	*21.0*
113406	3	1,614	11.0	89.0	0.7	0.6	7.0	2.7	6.9	13.1
113407	1	997	3.5	96.0	0.1	0.3	2.0	1.6	5.6	4.7
113407	2	699	19.6	90.4	0.3	1.0	1.9	6.4	12.4	*23.9*
113408	1	2,173	5.7	95.5	0.1	0.6	1.5	2.3	6.4	7.5
113408	2	2,156	9.4	93.6	0.3	0.5	2.2	3.4	7.4	12.0
113408	3	1,670	16.2	94.6	0.4	0.0	1.9	3.1	5.3	6.3
113409	1	1,552	7.7	97.7	0.5	0.3	0.6	0.9	3.3	3.5
113409	2	1,812	6.0	96.2	0.4	0.9	1.3	1.2	6.0	5.4
113409	3	1,594	6.4	93.9	0.5	0.9	1.8	2.9	6.7	9.4
113505	1	1,213	5.6	94.9	0.2	0.1	2.1	2.7	4.4	5.6
113505	2	1,762	19.2	90.1	0.7	1.3	3.4	4.4	10.3	16.4
113505	3	1,914	5.7	93.8	0.1	0.3	2.4	3.4	5.7	7.0
113505	4	1,412	15.4	93.6	1.6	0.5	2.0	2.4	7.8	13.2
113509	1	1,437	14.8	92.7	1.1	4.4	0.7	1.1	6.1	11.1
113509	2	1,105	17.1	88.3	1.2	1.8	4.9	3.8	8.1	16.0
113510	1	1,448	16.4	93.5	0.2	1.4	3.5	1.4	6.3	12.2
113510	2	1,027	11.1	93.9	0.1	0.7	2.9	2.4	4.7	6.1
113510	3	664	21.3	88.6	2.3	4.5	2.0	2.7	5.3	16.3
113511	1	2,293	8.0	91.1	1.3	0.7	4.9	2.0	6.2	13.2
113511	2	1,600	8.5	92.1	0.4	0.4	6.1	1.0	4.9	8.9
113512	1	2,492	8.2	90.1	1.6	0.9	5.3	2.2	6.8	15.6
113513	1	1,288	5.5	95.7	0.3	0.3	2.3	1.4	5.3	11.4
113513	2	1,039	4.2	93.5	0.3	0.8	4.2	1.3	4.4	9.8
113513	3	1,080	11.6	90.6	0.8	0.8	3.7	4.0	9.6	14.2
113513	4	1,850	8.1	95.0	0.8	0.4	1.5	2.3	4.4	5.4
113514	1	959	4.3	96.5	0.7	0.4	1.0	1.4	7.3	5.2
113514	2	3,032	8.4	93.2	1.0	1.3	1.4	3.1	5.7	9.2

113515	1	1,335	5.3	98.3	0.1	0.2	1.0	0.4	1.9	3.3
113515	2	1,350	8.4	96.4	0.4	0.2	1.5	1.6	4.2	10.3
113515	3	1,168	7.0	93.8	1.1	1.2	1.7	2.2	8.1	14.8
113516	1	2,093	1.6	94.0	0.5	0.3	2.4	2.9	5.9	8.5
113516	2	3,319	6.0	94.8	0.5	0.8	1.6	2.3	5.7	8.7
113517	1	1,390	6.5	94.2	0.4	1.2	3.5	0.8	6.0	8.4
113517	2	1,525	4.6	94.2	0.3	0.5	2.3	2.8	7.7	11.5
113517	3	2,298	8.4	93.3	0.2	0.7	1.9	3.9	8.2	12.7
113517	4	1,964	5.0	93.7	0.3	0.8	2.2	3.0	6.6	8.5
113518	1	1,036	0.0	96.8	0.1	0.0	2.8	0.3	2.6	4.0
113518	2	2,355	5.5	94.8	0.3	1.6	1.4	2.0	7.1	6.9
113518	3	2,317	8.3	95.3	0.0	0.0	0.9	3.7	6.1	8.8
113518	4	2,921	9.3	94.5	0.4	0.3	2.0	2.8	5.6	10.6
113519	1	1,834	5.4	93.7	0.2	0.5	3.7	1.9	4.9	7.2
113519	2	1,990	7.4	95.0	1.2	0.2	2.4	1.3	6.4	12.2
113519	3	1,960	11.5	90.7	0.7	0.7	2.6	5.4	9.5	12.2
113519	4	1,552	*23.3*	91.3	1.5	1.0	1.3	4.8	10.4	14.2
113520	1	584	8.3	92.3	1.5	0.3	1.9	3.9	6.7	7.7
113520	2	2,074	3.2	94.2	0.6	0.3	3.7	1.3	3.7	7.9
113520	3	1,438	6.0	90.5	1.8	1.2	3.4	3.1	8.7	18.0
113521	1	2,016	6.6	92.1	0.6	0.5	2.6	4.1	8.4	9.3
113521	2	1,586	3.3	91.9	1.1	0.3	5.0	1.6	5.2	11.0
113521	3	2,555	4.7	93.0	0.8	0.6	2.4	3.2	7.2	13.2
113522	1	1,216	0.3	90.0	0.8	0.5	4.3	4.4	6.8	12.7
113522	2	2,030	1.6	95.4	0.3	0.3	1.9	2.1	4.4	7.1
113523	1	2,472	5.5	91.2	1.0	0.2	5.6	2.0	6.2	12.1
113523	2	3,886	9.1	93.8	0.3	0.7	2.4	2.9	6.7	9.1
113524	1	962	5.0	97.0	0.4	0.0	0.2	2.4	4.4	5.4
113524	2	1,253	4.5	97.0	0.2	0.5	1.6	0.8	4.0	9.5
113524	3	1,114	9.6	96.1	0.3	0.4	1.3	1.9	3.5	5.9
113524	4	1,832	4.4	94.4	0.3	0.2	2.4	2.7	5.2	8.2
113524	5	2,274	1.1	92.5	0.4	0.6	3.9	2.6	5.3	7.7
1136	1	1,269	8.1	95.5	0.2	1.7	2.0	0.6	7.9	10.9
1136	2	917	4.3	96.0	0.0	1.6	1.6	0.8	9.4	15.5
1136	3	1,278	12.4	94.2	0.8	1.3	2.0	1.7	8.0	12.9
1136	4	1,181	18.8	95.7	0.5	0.8	0.1	3.0	9.7	10.3
1137	1	1,024	15.4	93.2	0.0	1.1	2.6	3.1	7.7	7.7
1137	2	1,655	7.7	93.7	0.1	0.1	4.0	2.0	7.1	17.5
1137	3	1,454	18.4	97.0	0.8	0.8	0.3	1.2	9.6	9.9
1137	4	2,537	9.4	96.5	0.4	0.5	1.8	0.9	6.4	8.3
113801	1	2,266	9.3	92.9	0.4	0.7	4.6	1.3	6.2	10.4
113801	2	1,589	14.3	92.2	0.4	0.6	4.8	2.0	5.9	14.7
113801	3	1,037	10.4	94.0	0.6	0.7	3.6	1.2	6.6	8.8
113801	4	1,154	11.8	93.7	0.5	1.0	1.9	2.9	8.3	12.2
113802	1	1,328	16.6	94.7	1.0	1.5	0.5	2.4	10.2	12.9
113802	2	1,476	17.6	93.4	0.8	0.3	2.0	3.5	13.1	19.7
113802	3	635	18.5	96.9	1.1	0.6	0.5	0.9	7.2	4.1
113803	1	2,266	13.7	93.9	0.2	0.8	3.9	1.3	6.1	9.5
113803	2	2,090	5.1	94.1	0.0	1.1	3.5	1.3	6.2	10.7
113901	1	798	10.7	91.6	0.0	5.1	0.8	2.5	10.0	10.3
113901	2	872	8.3	92.5	1.1	0.6	1.9	3.8	7.7	7.5
113901	3	1,636	**31.7**	90.6	0.9	0.4	2.8	5.3	*15.6*	*23.4*
113901	4	1,657	9.6	95.7	0.4	0.4	0.3	3.2	9.3	12.6
113903	1	1,526	5.8	96.3	0.5	0.4	1.3	1.5	5.6	9.7
113903	2	1,556	19.8	93.0	0.5	1.7	1.8	3.0	10.9	11.8
113904	1	1,240	4.1	96.6	0.2	0.3	1.0	1.9	7.4	8.3
113904	2	819	2.6	95.0	0.1	0.4	1.1	3.4	7.9	11.5
113904	3	1,265	9.9	93.0	0.9	0.5	1.0	4.5	7.7	8.9
113904	4	1,267	4.8	95.8	0.0	0.6	0.9	2.7	6.2	7.7

113905	1	1,653	13.1	95.9	0.4	0.3	0.5	2.8	7.0	9.6
113905	2	1,473	3.6	93.6	0.5	0.2	1.8	3.8	7.0	10.2
113905	3	923	3.4	95.6	0.0	1.6	2.0	0.9	4.8	8.3
113905	4	1,156	15.3	92.6	0.6	0.8	3.2	2.8	7.1	8.7
Juab										
9732	1	600	14.0	99.5	0.0	0.5	0.0	0.0	1.5	0.8
9732	2	191	20.7	73.8	0.0	*18.8*	0.0	7.3	7.9	*26.2*
Davis										
125401	2	959	5.3	97.8	0.0	0.3	1.7	0.2	2.2	5.8
125402	3	869	0.0	96.8	0.5	0.5	1.2	1.2	4.5	3.2
Box Elder										
9601	2	1,083	11.6	95.6	0.0	0.4	0.8	3.2	6.1	7.9
9601	3	405	11.2	98.0	0.0	0.2	0.0	1.7	2.5	2.0

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APPENDIX F

SITE SELECTION/EVALUATION FORMS

This appendix displays copies of the evaluation forms used by Private Fuel Storage, L.L.C., (PFS) in the process of identifying a site for the proposed spent nuclear fuel storage facility. Thirty-six sites (as shown in Table F.1) were subjected to initial screening. The characteristics of these sites are shown in Exhibits F.1 through F.38.

Exhibits F.39 to F.41 show the responses to a survey developed by PFS and sent to representatives of the three final candidate sites. PFS's site selection process identified the Reservation of the Skull Valley Band of Goshute Indians (i.e., site number 3 in Table F.1) as the preferred site for the proposed project.

Table F.1. Potential host sites considered for the proposed PFSF

No.	Potential host site	No.	Potential host site
01	Mescalero Reservation (Lower Three Rivers Site); New Mexico	20	Northern Arapaho; Wyoming
02	Mescalero Reservation (Ranch House Site); New Mexico	21	Ponca Tribe; Oklahoma
03	Goshute Tribe; Skull Valley, Utah	22	Prairie Island Sioux; Minnesota
04	Santee Sioux; Knox County, Nebraska	23	Sac & Fox Nation; Oklahoma
05	Absentee Shawnee; Oklahoma	24	San Juan County; Utah
06	Akhoik Kaguyak Tribe; Alaska	25	Tetlin Indian Reservation; Tetlin, Alaska
07	Alabama-Quassarte Tribe (Creek); Oklahoma	26	Tonkawa Tribe; Oklahoma
08	Apache County; Arizona	27	Ute Mountain Ute Tribe; Colorado
09	Apache Development Authority; Oklahoma	28	Yakama Indian Nation; Washington
10	NEW Corporation; Fremont County, Wyoming	29	City of Caliente & Lincoln County; Nevada
11	United Nuclear Corporation; New Mexico	30	U.S. Fuel and Security Service Group, Pacific Atoll (Palmyra Island); U.S. Protectorate
12	Caddo Tribe; Oklahoma	31	Barnwell; South Carolina
13	Chickasaw Nation; Oklahoma	32	Hanford; Richland, Washington
14	Eastern Shawnee; Oklahoma	33	Fort Wingate Army Depot; Gallup, New Mexico
15	Fifield Development Corp.; Fifield, Wisconsin	34	Atomic Energy of Canada Limited, Whiteshell Laboratories; Manitoba, Canada
16	Fort McDermitt Paiute Shoshone Tribe; Nevada	35	TGM, Inc.; White Sands, New Mexico
17	Grant County; North Dakota	36	Area 25, Nuclear Test Site; Nevada
18	Lower Brule Sioux; South Dakota	37	LADO Ranch; Texas
19	Miami Tribe; Oklahoma	38	Andrews County; Texas

Source: Table 8.1-1, PFS/ER 2001

Exhibit F.1

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING

MESCALERO RESERVATION LOWER THREE RIVERS SITE

SITE # 001

New Mexico

TRANSPORTATION

Within 25 miles of mainline railroad ? Yes

Railroad on site ? No

Site access to one or more highways ? Yes

SEISMIC

At least two miles from capable fault ? No

At least five miles from capable fault, no faults on-site ? No

Ground accelerations within envelope of existing running plant ? Yes

Ground accelerations .5g or less and within existing vendor design criteria ? No

FLOODING

Above 100 year return frequency flood per USGS ? Yes

Above 300 year return frequency flood per USGS ? Yes

HOST

Has sovereign immunity ? Yes

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? No

Is providing a site for lease or at a reasonable cost within jurisdiction ? No

Is providing a site with at least two 150 acre locations within a 5000 acre area ? No

Is providing a site with population density below 25/square mile within 2 miles of the site ? Yes

Is providing a site free of known historical sites, major recreational areas and endangered species ? Yes

PUBLIC ACCEPTANCE

Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? Yes

Has a resolution of the governing body on record in favor of the facility ? Yes

ANY UNIQUE FINDINGS Two votes, second passed. DOE Round 2 grant used.

REASON FOR REJECTION **Capable seismic fault on site.**

Exhibit F.2

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
MESCALERO RESERVATION RANCH HOUSE SITE
SITE # 002
New Mexico

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? No

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault? Yes

At least five miles from capable fault, no faults on-site ? No

Ground accelerations within envelope of existing running plant ? Yes

Ground accelerations .5g or less and within existing vendor design criteria ? Yes

FLOODING
Above 100 year return frequency flood per USGS ? Yes

Above 300 year return frequency flood per USGS ? Yes

HOST
Has sovereign immunity ? Yes

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? No

Is providing a site for lease or at a reasonable cost within jurisdiction ? No

Is providing a site with at least two 150 acre locations within a 5000 acre area ? No

Is providing a site with population density below 25/square mile within 2 miles of the site ? Yes

Is providing a site free of known historical sites, major recreational areas and endangered species ? Yes

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? Yes

Has a resolution of the governing body on record in favor of the facility ? Yes

ANY UNIQUE FINDINGS Two votes, second passed. DOE Round 2 grant used.

REASON FOR REJECTION **Unable to negotiate contract with Tribe.**

Exhibit F.3

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
GOSHUTE RESERVATION
SITE # 003
Utah

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? No

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault ? Yes - USGS

At least five miles from capable fault, no faults on-site ? Yes - USGS

Ground accelerations within envelope of existing running plant ? Yes - DOE

Ground accelerations .5g or less and within existing vendor design criteria ? Yes - DOE

FLOODING
Above 100 year return frequency flood per USGS ? Yes - DOE

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Yes

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? Yes

Is providing a site for lease or at a reasonable cost within jurisdiction ? Yes

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Yes

Is providing a site with population density below 25/square mile within 2 miles of the site ? Yes

Is providing a site free of known historical sites, major recreational areas and endangered species ? Yes - DOE

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? Yes

Has a resolution of the governing body on record in favor of the facility ? Yes

ANY UNIQUE FINDINGS Low haul on County Road used for hazardous materials best approach. County favors project due to closing of nearby military base. DOE Phase IIB Applied for 8/93.

REASON FOR REJECTION NA

Exhibit F.4

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
SANTEE SIOUX
SITE # 004
Nebraska

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? No

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknwon

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Yes

Above 300 year return frequency flood per USGS ? Yes

HOST
Has sovereign immunity ? Yes

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? Yes

Is providing a site for lease or at a reasonable cost within jurisdiction ? Yes

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Yes

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? No

ANY UNIQUE FINDINGS

REASON FOR REJECTION

Exhibit F.5

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
ABSENTEE SHAWNEE
SITE # 005
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 3/31/92, withdrew 6/9/92.**

Exhibit F.6

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
AKHIOK KAGUYAK TRIBE
SITE # 006
Arkansas

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 3/31/92, denied 6/92.**

Exhibit F.7

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
ALABAMA QUASSARTE TRIBE (CREEK)
SITE # 007
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 3/28/92, withdrawn 2/24/93.**

Exhibit F.8

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
APACHE COUNTY
SITE # 008
Arizona

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 3/18/92, denied 10/28/92.**

Exhibit F.9

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
APACHE DEVELOPMENT AUTHORITY
SITE # 009
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 3/31/92, Inactive.**

Exhibit F.10

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
NEW CORPORATION (FREMONT COUNTY)
SITE # 010
Wyoming

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? Yes

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? No

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? No

Has a resolution of the governing body on record in favor of the facility ? No

ANY UNIQUE FINDINGS The proposal is for a corporation running the facility and the utilities as customers, it lists costs as high as $160+ /MTU, staff of 500 people and earliest startup scenario of 2010. These issues would need to be resolved. The current state requires state approval at two benchmarks and a positive EIS for Yucca Mountain. No resolution from Shoshone Tribe which abuts property. DOE Phase I awarded 1/23/92.
REASON FOR REJECTION NA

Exhibit F.11

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
UNITED NUCLEAR CORPORATION
SITE # 011
New Mexico

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? Yes

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? No

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? No

Has a resolution of the governing body on record in favor of the facility ? No

ANY UNIQUE FINDINGS A cleanup site for uranium mill tailings. EPA report could answer many of the questions. No resolution on record in support by the Navaho Tribe which abut the project.

REASON FOR REJECTION NA

Exhibit F.12

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
CADDO TRIBE
SITE # 012
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 4/17/92, withdrawn 7/16/92.**

Exhibit F.13

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
CHICKASAW INDIAN NATION
SITE # 013
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 12/28/91, Awarded 02/14/92, Declined 3/31/92.**

Exhibit F.14

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
EASTERN SHAWNEE
SITE # 014
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 3/30/92, Applied Phase IIA 3/31/93, Denied Phase IIA 8/93.**

Exhibit F.15

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
FIFIELD DEVELOPMENT CORP
SITE # 015
Wisconsin

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? No

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 3/92, Denied.**

Exhibit F.16

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
FORT McDERMITT PAIUTE SHOSHONE TRIBE
SITE # 016
Oregon

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Yes

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS **DOE Applied Phase I 5/27/92, Applied Phase IIA 2/18/93, Awarded Phase IIA 6/1/93.**

REASON FOR REJECTION **NA**

Exhibit F.17

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
GRANT COUNTY
SITE # 017
North Dakota

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? No

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? No

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS **DOE Applied Phase I 11/19/91, Awarded 11/25/91.**

REASON FOR REJECTION ***County Board Recalled ?***

Exhibit F.18

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
LOWER BRULE SIOUX
SITE # 018
South Dakota

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 3/31/92, Inactive.**

Exhibit F.19

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
MIAMI TRIBE
SITE # 019
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I IA 3/31/93, Withdrawn 6/93.**

Exhibit F.20

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
NORTHERN ARAPAHO
SITE # 020
Wyoming

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS Same site as Fremont County & New Corp ??

REASON FOR REJECTION **DOE Applied Phase I IA 3/31/93, Denied 97/7/93.**

Exhibit F.21

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
PONCA TRIBE
SITE # 021
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS **DOE Applied Phase I 3/31/92, Awarded 9/4/92.**

REASON FOR REJECTION **NA**

Exhibit F.22

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
PRAIRIE ISLAND SIOUX
SITE # 022
Minnesota

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? Yes

Site access to one or more highways ? yes

SEISMIC
At least two miles from capable fault ? Yes

At least five miles from capable fault, no faults on-site ? Yes

Ground accelerations within envelope of existing running plant ? Yes

Ground accelerations .5g or less and within existing vendor design criteria ? Yes

FLOODING
Above 100 year return frequency flood per USGS ? Yes

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Yes

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS Intervenor against Prairie Island site of NSP

REASON FOR REJECTION **DOE Applied Phase I 12/20/91, Applied Phase IIA 3/31/93, Denied 5/10/93.**

Exhibit F.23

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
SAC & FOX NATION
SITE # 023
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS **DOE Applied Phase I 12/30/91, Awarded 2/18/92.**

REASON FOR REJECTION **Grace Thorp a tribal member stopped further participation.**

Exhibit F.24

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
SAN JUAN COUNTY
SITE # 024
Utah

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS **DOE Applied Phase I 3/27/92, Awarded 5/4/92.**

REASON FOR REJECTION **NA**

Exhibit F.25

1

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
TETLIN VILLAGE
SITE # 025
Arkansas

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase I 3/30/92 Denied 8/92.**

Exhibit F.26

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
TONKAWA TRIBE
SITE # 026
Oklahoma

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Yes

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? Yes

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? No

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? No

Has a vote of host population on record in support of the facility ? No

Has a resolution of the governing body on record in favor of the facility ? Yes

ANY UNIQUE FINDINGS **DOE Applied Phase I IA 3/31/93, Awarded 9/30/93.**

REASON FOR REJECTION **Tribe voted against facility Fall, 1994.**

Exhibit F.27

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
UTE TRIBE
SITE # 027
Colorado

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION **DOE Applied Phase IIA 3/31/93, Withdrawn 8/9/93.**

Exhibit F.28

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
YAKIMA INDIAN NATION
SITE # 028
Washington

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS **DOE Applied Phase I 12/20/91, Awarded 318/92.**

REASON FOR REJECTION **NA**

Exhibit F.29

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
CITY OF CALIENTE & LINCOLN COUNTY
SITE # 029
Nevada

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? Yes

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? No

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? No

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Yes

ANY UNIQUE FINDINGS

REASON FOR REJECTION NA

Exhibit F.30

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
PACIFIC ATOLL
SITE # 030
Protectorate

TRANSPORTATION
Within 25 miles of mainline railroad ? No

Railroad on site ? No

Site access to one or more highways ? No

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? No

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS ***US Fuel & Security Service Group***

REASON FOR REJECTION **High cost, would require ocean shipping in International waters.**

Exhibit F.31

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
BARNWELL
SITE # 031
South Carolina

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? No

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS ***Long transportation routes to Yucca Mountain.***

REASON FOR REJECTION

Exhibit F.32

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
HANFORD
SITE # 032
Washington

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? Unknown

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION

Exhibit F.33

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
FORT WINGATE ARMY DEPOT
SITE # 033
New Mexico

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? No

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Yes

Above 300 year return frequency flood per USGS ? Yes

HOST
Has sovereign immunity ? No

Does not require Federal Land transfer ? No

Is a Tribe or community of less than 4000 population ? No

Is a Tribe or community of less than 500 population ? No

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Yes

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Yes

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? No

Has a resolution of the governing body on record in favor of the facility ? No

ANY UNIQUE FINDINGS

REASON FOR REJECTION

Exhibit F.34

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
AECL WHITESHELL LABORATORIES
SITE # 034
Canada

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? No

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault? Yes

At least five miles from capable fault, no faults on-site ? Yes

Ground accelerations within envelope of existing running plant ? Yes

Ground accelerations .5g or less and within existing vendor design criteria ? Yes

FLOODING
Above 100 year return frequency flood per USGS ? Yes

Above 300 year return frequency flood per USGS ? Yes

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Yes

Is providing a site with population density below 25/square mile within 2 miles of the site ? Yes

Is providing a site free of known historical sites, major recreational areas and endangered species ? Yes

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION

Exhibit F.35

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
TGM, WHITE SANDS
SITE # 035
New Mexico

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? No

Site access to one or more highways ? No

SEISMIC
At least two miles from capable fault? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Yes

Above 300 year return frequency flood per USGS ? Yes

HOST
Has sovereign immunity ? No

Does not require Federal Land transfer ? No

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? Yes

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Yes

Is providing a site with population density below 25/square mile within 2 miles of the site ? Yes

Is providing a site free of known historical sites, major recreational areas and endangered species ? Yes

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Yes

Has a vote of host population on record in support of the facility ? No

Has a resolution of the governing body on record in favor of the facility ? No

ANY UNIQUE FINDINGS

REASON FOR REJECTION

Exhibit F.36

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
AREA 25 NUCLEAR TEST SITE
SITE # 036
Nevada

TRANSPORTATION
Within 25 miles of mainline railroad ? No

Railroad on site ? No

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault ? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Yes

Above 300 year return frequency flood per USGS ? Yes

HOST
Has sovereign immunity ? Yes

Does not require Federal Land transfer ? No

Is a Tribe or community of less than 4000 population ? No

Is a Tribe or community of less than 500 population ? No

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Yes

Is providing a site with population density below 25/square mile within 2 miles of the site ? Yes

Is providing a site free of known historical sites, major recreational areas and endangered species ? Yes

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? No

Has a vote of host population on record in support of the facility ? No

Has a resolution of the governing body on record in favor of the facility ? No

ANY UNIQUE FINDINGS

REASON FOR REJECTION

Exhibit F.37

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
LADO RANCH
SITE # 037
Texas

TRANSPORTATION
Within 25 miles of mainline railroad ? Yes

Railroad on site ? Yes

Site access to one or more highways ? Yes

SEISMIC
At least two miles from capable fault? Yes

At least five miles from capable fault, no faults on-site ? Yes

Ground accelerations within envelope of existing running plant ? Yes

Ground accelerations .5g or less and within existing vendor design criteria ? Yes

FLOODING
Above 100 year return frequency flood per USGS ? Yes

Above 300 year return frequency flood per USGS ? Yes

HOST
Has sovereign immunity ? No

Does not require Federal Land transfer ? Yes

Is a Tribe or community of less than 4000 population ? Yes

Is a Tribe or community of less than 500 population ? Yes

Is providing a site for lease or at a reasonable cost within jurisdiction ? Yes

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Yes

Is providing a site with population density below 25/square mile within 2 miles of the site ? Yes

Is providing a site free of known historical sites, major recreational areas and endangered species ? Yes

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? No

Has a resolution of the governing body on record in favor of the facility ? No

ANY UNIQUE FINDINGS

REASON FOR REJECTION

Exhibit F.38

FUEL STORAGE SITE PROPOSAL INITIAL SCREENING
ANDREWS COUNTY
SITE # 038
Texas

TRANSPORTATION
Within 25 miles of mainline railroad ? Unknown

Railroad on site ? Unknown

Site access to one or more highways ? Unknown

SEISMIC
At least two miles from capable fault? Unknown

At least five miles from capable fault, no faults on-site ? Unknown

Ground accelerations within envelope of existing running plant ? Unknown

Ground accelerations .5g or less and within existing vendor design criteria ? Unknown

FLOODING
Above 100 year return frequency flood per USGS ? Unknown

Above 300 year return frequency flood per USGS ? Unknown

HOST
Has sovereign immunity ? Unknown

Does not require Federal Land transfer ? Unknown

Is a Tribe or community of less than 4000 population ? Unknown

Is a Tribe or community of less than 500 population ? Unknown

Is providing a site for lease or at a reasonable cost within jurisdiction ? Unknown

Is providing a site with at least two 150 acre locations within a 5000 acre area ? Unknown

Is providing a site with population density below 25/square mile within 2 miles of the site ? Unknown

Is providing a site free of known historical sites, major recreational areas and endangered species ? Unknown

PUBLIC ACCEPTANCE
Is an area free of a history of pro-active antinuclear referenda ? Unknown

Has a vote of host population on record in support of the facility ? Unknown

Has a resolution of the governing body on record in favor of the facility ? Unknown

ANY UNIQUE FINDINGS

REASON FOR REJECTION

Exhibit F.39

EXECUTIVE SUMMARY

The Skull Valley Band of Goshutes, (Tribe), have been pursuing a Interim Spent Fuel Storage Installation (ISFSI) on the Skull Valley Goshute Reservation in Tooele County, Utah. Given the extensive proven experience of the Tribe's consultants in siting nuclear facilities and with the commitment from PFS, the Tribe believes a ISFSI could be licensed for construction within 24 months. The only caveat is the assumption that there will be no significant changes in the present Federal regulations that now control the process. With the surrounding presence of both NRC and State licensed nuclear waste facilities; two hazardous waste incinerators; the Dugway Proving Ground, and the Tooele Army Depot's nerve gas incinerator, which is about to begin continuous operation with the blessing of the State, the only credible opposition mounted to an ISFSI located on the Skull Valley Reservation will be on philosophical grounds. In addition, because of the extensive effort to characterize and remediate chemical warfare material (CFM) sites placed on the Skull Valley Reservation by the Department of Defense (DOD) in 1968, there could be substantial savings made, both in time and money, in the simultaneous siting of an ISFSF. This program, which is expected to begin within the next few weekswould allow for mimimizing early political exposure to the ISFSI siting process.

In addition to the many favorable site attributes of an ISFSI located on the Skull Valley Reservation, there are also some possible logistic advantages as well. The Tribe has previously determined that there is a complete capability locally to build all the necessary storage and shipping containers that would be required over the life of the project. Implicitly, this option would provide significant cost savings. Manufacturing the shipping casks locally, transporting the casks to the reactors and then returning them when loaded to the ISFSF would preclude the need for any "dead head" transport. Because the manufacture of the storage and shipping containers could also provide significant local employment, public acceptance of the ISFSI would probably be much greater than it would be otherwise.

A summary of some of the significant attributes that favor the siting an ISFSI on the Skull Valley Goshute reservation are:

- **An extensive Environmental Impact Analysis prepared in 1987 by the State of Utah for their Supercondicting Super Collider proposal, includes a major portion of the Skull Valley north of the proposed ISFSI site on the Goshute Reservation. (See Attachment A).** In effect, the State of Utah has made a de facto determination that the Skull alley is suitable for locating engineered facilities that are far more complex and would have had a much higher Environmental impact than ISFSI. With the exception of the socio-economic analysis and a limited amount of site specific data, most all of the data in the SSC Siting Proposal could be used directly to satisfy Federal and State regulatory requirements.

Exhibit F.39 (continued)

* A Final Environmental Impact Statement for Envirocare of Utah's Section 11e. (2) radioactive waste storage site near Clive. Utah site was issued by the NRC in August, 1993 (NURB-1476), for the Clive, Utah site located in the middle of the proposed SSC site and just west of the north end of the Skull Valley. With the exception of depth to ground water (greater at ISFSI) and the ground water quality (poorer at Clive), site conditions at the proposed ISFSI site and the Clive site are essentially the same. The SSC Siting Proposal data were updated and used by Envirocare and the NRC as the principal source for preparing the EIS. The State of Utah concurred in all of the findings.

* Envirocare has also been, and is currently, licensed by the State of Utah (an agreement state) to dispose of Naturally-Occurring Radioactive Material (NORM) waste and low activity, low level radioactive waste (LLW) at the Clive site. In addition, Envirocare has a license from the State of Utah to dispose of mixed radioactive waste material, as regulated under RCRA. The NRC concurred in all of the findings.

* The Nuclear Regulatory Commission issued a Final Safety Evaluation Report (NUREG-1486) in January, 1994, on Envirocare's Clive site. The site was licensed under Appendix A to 10 CFR Part 40. Appendix A to CFR Part 40 requires effective control for up to 1000 years, to the extent achievable, and in any case for at least 200 years. Since the lifetime of the proposed ISFSI will be considerably shorter than 200 years, there should be no difficulty in meeting the less stringent regulatory requirements imposed by 10 CFR Part 72 and Appendix A to 10 CFR Part 100.

* The DOD has built and tested a nerve gas incinerator at the Tooele Army Depot South in the Rush Valley, immediately to the east and south of the Skull Valley Goshute Reservation. With full support from the State of Utah and Tooele County, the facility is expected to begin continuous operation within the next few months. Complete emergency procedure and evacuation plans are in place and operable. These procedures and evacuation plans are far in excess of any possible requirements that would ever by necessary to license and operate an ISFSI. Because the State of Utah and the Federal government are willing to accept the risk of this operation to those citizens living nearby in the Skull Valley and the rest of Tooele County and the Wasatch front, it seems reasonable to expect that risk from operating a much less hazardous ISFSI would also be acceptable.

* The Dugway Proving Ground starts a few miles south and west of the Skull Valley Goshute Reservation. The Dugway Proving Ground has been operation since the mid 1940's and is the principal area used to test Chemical and Biological Warfare Materials. Test of the nerve gas VX in 1968 were considered to be the cause of thousands of sheep dying in the Skull Valley and the adjacent Rush Valley where the nerve gas incinerator is located. Approximately half of the containated sheep were buried on the Skull Valley Goshute Reservation. The remainder of the contaminated sheep were buried immediately to the west of the Goshute Reservation at the south end of Skull Valley. Although operations at Dugway Proving Ground have been reduced somewhat, with the encouragement of the State of Utah, the facility is expected to continue operating for

3

Exhibit F.39 (continued)

sometime to come regardless of the attendant risk to those living in the Skull Valley. Because the State of Utah and the Federal government are willing to accept the risk of future operations at Dugway impacting the citizens of Skull Valley and the rest of Tooele County, it seems reasonable to expect that the risk from operating a much less hazardous ISFSF would also be acceptable.

I. LOCATION:

The location of this proposed site is T5S. R8W on the Skull Valley Goshute Reservation, Skull Valley, Utah. This site will comprise approximately one section of land on the Skull Valley Goshute Reservation. The enclosed maps show the Reservation and the proposed site. Interstate 80 is approximately 26 miles directly north of the Skull Valley Reservation. Tooele County Skull Valley road travels north to south through the Reservation.

II. HOST JURISDICTION ACCEPTANCE

There will be no change in jurisdiction prior to or after licensing. The Skull Valley Goshutes are a "treaty tribe". Their separate political sovereignty is recognized by the United States government pursuant to federal law. The Skull Valley Goshutes went through the entire federal process under the Office of Nuclear Waste Negotiator and signed an agreement to enter into formal negotiations with the United States government to site, license and build a interim storage facility for spent nuclear fuel. The Tribe was successful in becoming the voluntary candidate site for the United States under the Nuclear Waste Policy Act of 1982 as amended in 1987. Once the Tribe completed the federal process, the entire federal program was canceled.

The Tribe has spent a considerable amount of resources, (both monetary and time), in studying this issue. Tribal members were given a tour of the Idaho National Engineering Laboratory. The Tribal Chairman has consulted with scientists in Japan, France, Great Britain, Sweden and numerous experts in the United States. The Tribal government has comprehensively studied this problem of safe transportation and storage of spent nuclear fuel. They produced a full report and video on this subject both of which have previously been made available to you. Enclosed is another copy of the Phase II video.

The Tribe has the permission of the Tribal members to build this facility on the Reservation. A General Council Resolution was passed which authorizes the Skull Valley Goshute Tribal government to build this project.

The surrounding community has a good working relationship with the Tribe. During the federal process, the Tribe was able to obtain a $13,000 federal grant for Tooele County to properly study the social and economic impact of the proposed MRS.

4

Exhibit F.39 (continued)

This County has substantial experience with major waste issues. Tooele County has licensed a hazardous waste corridor. There are two hazardous waste incinerators, one major hazardous waste landfill and a low level radioactive waste dump in this corridor. The County is also the site of a nerve gas incinerator and a biological and chemical weapons laboratory with Dugway Proving Grounds. This top secret laboratory is located immediately next to the Reservation.

The people in Tooele County have extensive experience in working with major national weapons programs and difficult waste industries. They are not readily swayed with rhetorical arguments. This skilled labor force will welcome this project *if* the entities involved are honest and build this facility to world class standards of safety.

There are no jurisdictional restrictions which would prohibit or significantly restrict construction or operation of an ISFSI. The reason is, state law does not apply on this Reservation. What federal restrictions are imposed at a later date cannot be commented upon at this time. The neighboring communities do not have jurisdiction over the Tribe. They are separate political sovereigns. Although the people in Tooele County support this facility, even if they opposed it, they do not have the legal authority to stop this project.

The print media has been relatively even handed in accurately reporting this issue. The Tribe made it a point to maintain diplomatic media contacts. Most reporters in Salt Lake have at one time or another interviewed the Tribal Chairman and/or their attorney. The Tribe has issued press releases and been very careful not to make enemies with the media. The Tribe has co-sponsored charitable events and maintained a socially responsible position on important issues which affect members and others in the surrounding community. Most of the television and print media followed the MRS project. With regards to Yucca mountain, not all of the Utah media has been actively following this issue. The Tribe understands the importance of good media relations.

III. SITE OWNERSHIP

The Skull Valley Goshute Tribe holds title to the proposed site. The railroad transportation corridor, depending on where the railroad is located, is owned by the Bureau of Land Management See enclosed map. The railroad which runs immediately adjacent to Interstate 80 is owned by Union Pacific. This company previously owned a hazardous waste landfill at Grassy Mountain and a hazardous waste incinerator. Both of these hazardous waste projects are located on the Tooele County Hazardous Waste Corridor. The title to the site will always remain with the Skull Valley Goshute Tribe.

IV. TRANSPORTATION ACCESS

The proposed site is 26 miles from a Union Pacific railroad. See enclosed maps of Tooele County, Utah. A offload facility could be built at the Timpie junction, where Union Pacific currently unloads hazardous waste containers. The casks carrying the spent

5

Exhibit F.39 (continued)

fuel could then be loaded on a trucks and hauled to the proposed site. The offload facility can save the costs and expense of building a railroad to the site. Transporting the casks from Timpie to the Reservation along the Tooele County Skull Valley road can be accomplished is a very short time frame.

A railspur could certainly be built over time. However, the Tribe would recommend first building an off load facility at Timple and transporting the casks to the Reservation on certified truck haulers licensed by the Department of Transportation for Type A transports. This will allow the project to proceed without the delays of obtaining permission from the Bureau of Land Management for a rail spur. It will also save money. Under current federal law and the Interstate Commerce Clause of the US Constitution, other jurisdictions cannot stop the shipments of spent fuel to the Reservation.

The Interstate highway nearest to the proposed site is Interstate 80 which traverses east to west between Utah and Nevada. See Enclosed Map. This highway is 26 miles from the site. The road is capable of heavy hauls. Currently, the Skull Valley Road is used by Dugway Proving Grounds for hauling of heavy military equipment, i.e. howitzers, major battle tanks, etc. The Tribe also uses this highway to haul heavy rocket motors for testing on the Tekoi Rocket Test Facility on the Reservation.

The Skull Valley Road provides truck access to the site. The road should be upgraded with or without this project. Monies for upgrading this road might be available from the Department of Transportation, the Department of Energy, the Department of Defense and the Bureau of Indian Affairs. One of the considerations for approaching the federal government for funding for upgrading the road or for building a rail spur and other money which will be needed is an unsolicited proposal. This proposal will be for storage of spent nuclear fuel at this site in exchange for federal funding assistance with this project.

IX. DEMOGRAPHY

The permanent polulation within 10 miles of the proposed site is the Skull Valley Goshute Tribal Village and the town of Dugway, Utah. The Village has approximately 40 permenant residents. The town of Dugway, Utah has a population of approximately 2,000 when occupied full time. This town has lost some of it's population due to the cutback in defense spending and transfers of missions from this military base to other parts of the country. The enclosed data on Tooele County specifically details this information. The labor for construction can be housed at English Village located approximately nine miles south of the site. This residential village was built for the military at Dugway. Presently, comfortable housing is available for a construction force to build this facility. Permanent housing can also be made available at English Village.

6

Exhibit F.39 (continued)

XIII. SOCIO-ECONOMIC CONSIDERATIONS

The availability of and proximity of a potential labor force is within 50 miles of the proposed site. Nine miles south of the Reservation is English Village, a residential complex for the labor and military for Dugway Proving Grounds. The town of Dugway has a public school system, including a high school and a small medical center for on base personnel and contractors. The Tribe has an excellent relationship with Dugway. Many Tribal school children attend public school at Dugway. Tribal members use the clinic and shop at the base. Due to cutbacks in the defense sector of the economy, Dugway Proving Grounds has lost some personnel and scaled back their mission. This project will be welcome by people in Dugway who work with chemical and biological weapons which are far more dangerous than spent nuclear fuel. The following data from Tooele County fully explains the physical, human and economic resources available for this project. Also included is a brochure on "The Tooele Chemical Agent Disposal Facility"

Exhibit F.40

RESPONSE TO SITE SELECTION QUESTIONNAIRE FOR INDEPENDENT SPENT FUEL STORAGE INSTALLATION

I. LOCATION

1. Specify location of proposed site.
   a. State, County, or other political jurisdiction

Response: Shoshoni, Fremont County, Wyoming.

   b. Tribal reservation.

Response: n/a

2. Specify size and site configuration.

Response: 2700 total acres. For configuration, please see Map No. 1.

3. Provide maps of site and area showing location, size, configuration and transportation corridor(s), together with jurisdictional boundaries.

Response: Please see Map No. 2.

II. HOST JURISDICTION ACCEPTANCE

1. Identify the jurisdiction or jurisdictions in which the site is located.

Response: The site is located in the State of Wyoming, in Fremont County, near Shoshoni.

2. Would there be any change in jurisdiction prior to licensing, construction or operation of the ISFSI? If so, identify other jurisdiction involved, and describe how and when such change would be accomplished.

Response: There would be no change in political jurisdiction over the site.

3. Describe basis for concluding that applicable jurisdiction (state/local; tribal) is a willing host.

Exhibit F.40 (continued)

Response:

In 1991 the Fremont County Commissioners requested from the Federal Government under the Nuclear Waste Fund Site Selection Program a $100,000 grant to begin initial studies. That money was received and spent in a very public and open Countywide evaluation process. The County Commissioners then authorized requesting the Phase 2B money (Three million dollars second phase money for statewide education).

At that point Governor Sullivan wrote an objection letter based upon <u>the facility being owned and operated by the Department of Energy.</u> That stopped that particular process. Four of the five County Commissioner who voted in favor of those actions are still on the Commission. Two of them have faced re-election and have won large margin victories. Ongoing contact has been made with the County Commission as to NEW Corp's program and there has been continued support from those particular Commissioners.

State Senator Bob Peck, the man in Wyoming most closely identified with this process since day one, has stood for election since the County Commissioner's project and has had a resounding re-election.

Attached is a copy of Goals 2000 Report which is a Riverton Chamber of Commerce/City of Riverton ongoing evaluation in what areas our community wants to proceed. Please note that the "MRS" (now NEW Corp/ISFSI continues to received high community support.

PLEASE NOTE IN THIS PARTICULAR CASE the Host would be NEW Corp and not one of the political subdivisions. It is NEW Corp's realistic belief, however, that the above mentioned ongoing evidence of support will not be eroded in the future and that NEW Corp continues to present a project which is favored by a strong nucleus of the communities within Fremont County. Senator Bob Peck indicates that in his traveling the State and in his attending various legislative interim sub-committee meetings, that there continues to be strong interest by citizens and legislators from outside of Fremont County.

4. Provide information on any surveys or opinion polls on views of residents in vicinity of proposed site to ISFSI.

Response: Please see above for election results.

5. Identify (and provide copes of) any jurisdictional restrictions, including applicable stale, local or tribal laws or regulations, which could prohibit or significantly restrict construction or operation of an ISFSI.

2

Exhibit F.40 (continued)

Response: I have already provided Mr. Northard and Mr. Parkyn with these.

6. Describe positions taken by local, regional and state-wide media on location of an ISFSI at proposed site or other locations.

Response: The Casper Star Tribune is the largest paper in the State located in Casper, Wyoming. It is a Scripps-Howard chain newspaper. It tends to be more "sensational" with its reporting of events. It has historically shown a editorial negative aspect (largely based on the prior MRS concept of government ownership).

It has now undergone a change in the position of publisher and although nothing dealing with NEW Corp has been public since then, it appears that the anti-mining, anti-oil and gas approach is being modified. The source of this understanding comes from John Atkins, public relations officer of Pathfinder/Cogema. Mr. Atkins and his office are in Cheyenne, Wyoming.

The State Capital is in Cheyenne and the Cheyenne Tribune editorialized during the Legislature two years when the existing State law was passed that it was in favor of allowing the facility.

The local community newspapers generally tend to be neutral in their editorialism.

There are no regional papers (The Billings Gazette and the Denver Post) which have seemed to take any substantial stand.

III. SITE OWNERSHIP.

1. Identify the individual or entity that currently holds title to the proposed site, and to the railroad transportation corridor.

Response: The proposed site consists of an overall area of approximate 2700 acres which is owned by a family corporation. NEW Corp has negotiated an Option to Purchase of the entire 2700 acres with the corporation. Within the option agreement, it is <u>clearly pointed out</u> the intended use of the property. It was NEW Corp's belief that full disclosure at all times and at all places was appropriate.

The proposed site wraps around both Burlington Northern Mainline and the Bad Water Line Spur line so that no property owned by other persons needs to be crossed by the Spur line or the mainline of the railroad.

3

Exhibit F.40 (continued)

The dirt road/county road which is shown in orange on Map No. 3 running parallel to the Spur line is a county road and its exit point comes off of State Highway 20/26.

2. Would title be transferred to another entity in connection with development of the ISFSI If so, identify the other entity and describe when and how title would be transferred.

Response: Title would not be transferred to any other entity. Perhaps the non-consumed land in the overall option total acres may be transferred to a different entity but the land actually used (assuming 200 consumed) is not intended to be transferred to any other entity.

3. If you do not currently own the site, provide the estimated cost to acquire it.

Response: The current option price for the entire 2700 acres is $1,000,000.00. That is a price which is a multiple of many times its value as agricultural grazing land. ($50.00 to $75.00 per acre).

No attempt has been made to this date to negotiate that number down in that within the entirety of Fremont County, this is the <u>only site</u> that has the confluence of major railroad, a functional and currently working spur line, sufficient land on either side of the spur line to handle the 200 acre facility, and no other entity owing any land which must be crossed in order to get to the facility site.

IV. TRANSPORTATION ACCESS

1. Describe the accessibility of the proposed site by railroad.

(a) Identify the railroad mainline(s) and their distance from the proposed site.

Response: On Map No. 2, the Burlington Northern mainline is shown as highlighted by the pink color. It is NEW Corp's belief that a substantial majority of the power plants to be served by this facility lie within the overall Burlington Northern rail system.

4

Exhibit F.40 (continued)

It is also to be recognized that the Burlington Northern line has now merged with another line so that there are hundreds of miles of additional track made part of the Burlington system.

The violet colored line on Map No. 1 is labeled Chicago and Northwestern. It no longer is owned by Chicago and Northwestern and is owned by a group of three gentlemen in Riverton, Wyoming who operate the line under the name of The Bad Water Line. These gentlemen are in the trona (soda ash) transportation business and operate approximately 100 tanker trucks that haul trona from Rock Springs/Green River, Wyoming to Bonneville to put it on the Burlington Northern to serve eastern United States manufacturers.

These gentlemen are progressive businessmen who have upgraded the line a 100 pound track.

(b) Does a rail spur exist to the proposed site or close thereto? If so, identify and describe. Is it capable of handling spent fuel shipments?

Response: Please see response to (a) above.

(c) If no rail spur exists to the proposed site, describe the terrain between the mainline(s) and the site, identify the jurisdiction through which such a rail spur to the site, including cost, ownership and availability of right-of-way, environmental impacts of construction and operation, etc.

Response: Please see response to (a) above.

(d) Provide other information relevant to the accessibility of the proposed site by railroad.

Response: Please see response to (a) above.

2. Describe the accessibility of the proposed site by highway.

(a) Identify the interstate highways and major thoroughfares closest to the proposed site and their distances from the site.

Response: On Map No. 2 in light blue, running east and west is the highlighted State Highway 20-26. It is wide double lane highway of good and substantial construction and width. On the west (right side of the map as

5

Exhibit F.40 (continued)

indicated) that Interstate 25 at Casper, Wyoming is approximately 80 miles away from the site. Interstate 25 runs north from Interstate 80 at Cheyenne, Wyoming to Casper and then north to Billings, Montana.

Also it is noted in light green that the Highway 20-26 which travels north through Shoshoni goes north to Boysen Lake and Boysen Dam which are 15 miles north of Shoshoni, north to Thermopolis which is 30 miles north of Shoshoni and north to Billings, Montana which is 225 miles away and where Interstate 90 intersects from I-25 coming from Casper.

Interstate 80 is due south of Shoshoni approximately 200 miles.

The "local area map" which is Map No. 1 and the State of Wyoming which is Map No. 2 should be reviewed in common to see how these State roadways and rail lines intersect. The closest roadway, of course, is State Highway 20-26 from which the Fremont County road exits on to the site property. State Highway 20-26 is approximately one-half mile from the beginning of the total optioned area and one mile from the proposed site area.

(b) Identify and describe existing roads suitable for major truck traffic from the proposed site to the interstate highways and major thoroughfares identified above.

Response: State Highway 20-26 (east/west Riverton to Casper highway) and State Highway 20 (the State highway north from Shoshoni to Thermopolis and Billings) are both capable of major truck traffic. Highway 20-26 is a better highway both as to its geographic layout, its width and maintenance and to its closer access to the Interstate system in Casper.

(c) To the extent that suitable roads for major truck traffic do not currently exist, describe the terrain over which such a road to be proposed site would need to be constructed, identify the jurisdictions through which such a road would pass, and provide other information relevant to constructing such a road, including cost, ownership and availability of right-of-way, environmental impacts of construction and operation, etc.

Response: Please see responses to (a) and (b) above.

(d) Provide other information relevant to the accessibility of the proposed site by highway.

Response: Please see responses to (a) and (b) above.

6

Exhibit F.40 (continued)

V. SEISMOLOGY

1. Provide copies of available seismic analysis of the site vicinity and surrounding region.

Response: Please see Exhibits A and B and Maps 4 and 5.

2. Are any known faults or geologic evidence of fault offsets located on or within 5 miles of the site?

(a) Describe and provide available information on the location and size of such faults or geologic evidence of fault offsets.
(b) Describe and provide available information on earthquakes associated with such faults or potentially associated with such faults or geologic evidence of fault evidence.
(c) Describe and provide any other currently available information concerning such faults or geologic evidence of fault offsets.

Response: Please see Exhibits A and B and Maps 4 and 5.

3. Are any known faults located within 200 miles of the site? If so, provide the information request in V. 2(a)-(c) above with respect to such faults.

Response: Please see Exhibits A and B.

4. Have earthquake tremors or ground acceleration been experienced or recorded in the site vicinity or surrounding areas? If so, describe and provide available information concerning such historical earthquakes, including the epicenters and ground accelerations associated with the earthquakes.

Response: Robert Anderson, President of NEW Corp has lived in Riverton for 47 years. If there have been any earthquakes tremors or ground accelerations they are unknown to him.

In the late 1950's or early 1960's an earthquake took place in Yellowstone Park.

7

Exhibit F.40 (continued)

There have been other earthquakes, but very small in significance in areas greater than 150 miles distant. As to this specific Site Area, no personally known seismic activity has taken place.

Please refer to the response to 2. (a) and (b) above for further information.

5. Based on the available information, does the proposed site lie "within the range of strong near-field ground motion from historical earthquakes on large capable faults?" See 20 C.R.R. Section 72.102(b).

Response: Please see the response to 2. (a) and (b) above.

VI. GEOLOGY/SOILS

1. Provide copies of available geologic analyses of the site, site vicinity (including transportation corridor(s) and, region.

Response: Please see the enclosed Exhibits A and B.

2. Describe soils and bedrock types at the site and (if not yet constructed) rail and highway access.

Response: Please Exhibits C & D. These are drilling logs from people within several hundred yards of the proposed site. The drilled water wells from domestic consumption. The logs are self-expressive as to what the surface and subsurface terrain is like.

3. Describe and provide available information on other geologic characteristics of the proposed site, not described above, in particular any geologic characteristics that may be considered unstable.

Response: Please see VI. 1. above and V 2. (a) and (b) above.

4. Describe and provide available information concerning the topography of the proposed site.

Response: Please see the enclosed photographs which show general surface conditions of the area. Attached to Map No. 1.

8

Exhibit F.40 (continued)

VII. HYDROLOGY

1. Provide copies of available ground and surface water analyses for the site and site vicinity.

Response: By way of historical anecdote, the area is classified as <u>high desert</u> and receives an annual average of 6 to 10 inches of combined rain or snow based on total water accumulation.

The sandy soils absorb the water rather quickly.

Snow accumulations in the area in the winter time are seldom more than 3 or 4 inches for a couple of days.

Included with this at Exhibit D are water well bore hole logs which will show volume of water at specific depths and the types of subsurface stratification involved.

2. If a Probable Maximum Flood has been determined for the site, provide the analysis and show whether any part of the site of transportation corridor

Response: If a Probable Maximum flood has been calculated, no one in this area has been able to determine that.

There are no streams, lakes or retention basins above the elevation of this site.

3. Does any part of the site or transportation corridor(s) lie within a flood plan? If so, provide available information.

Response: No.

4. Is any part of the site or transportation corridor(s) considered to be wetlands?

Response: No.

5. Is the site or any portion of the site subject to flooding? Describe the frequency and severity of any flooding and provide any studies or evaluations that have been performed on the potential for flooding in the site vicinity and surrounding areas.

Response: Historically, none has happened.

9

Exhibit F.40 (continued)

6. Identify the distance to groundwater at the site.

Response: See Map as referred to in 1.

VIII. ENVIRONMENTAL CONDITIONS

1. Provide copies of available environmental analyses for the site, transportation corridor(s) and site vicinity.

Response: Any environmental analyses of the site and its vicinity are done by the Nature Conservancy and their reports are attached at Exhibit E.

2. Identify any endangered or threatened plant or animal species that have been found in the site, transportation corridor(s), site vicinity and region.

Response: Please see Nature Conservancy report which fails to show any endangered or threatened species.

3. Describe any historical sites on or in the region surrounding the proposed ISFSI site or in the areas surround the proposed railroad or highway access to the site.

Response: There are no known or designated historical site. There are no known non-designated historical sites within several miles of the area.

4. Describe any archeological or cultural sites on or in the region surrounding the proposed ISFSI site or in the areas surrounding the proposed railroad or highway access to the site.

Response: There are no known archeological or cultural sites in the area.

5. Identify and describe recreational areas and facilities within ten miles of the proposed site and transportation corridor(s).

Response: Boysen Lake is popular Central Wyoming fishery year around and beach and boating enthusiast destination therein four to five summer months.

Exhibit F.40 (continued)

Most of the popular areas are more than 10 miles away although "as the crow flies" the eastern boundary of the Lake is within 10 miles of the site.

6. Describe the current land use of the site, transportation corridor(s) and site vicinity.

Response: Currently the land is used for livestock grazing approximately five months of the year.

7. Provide any available information on project future land use in the vicinity of the site and the transportation corridor(s).

Response: It is hard to determine future use of any of the land in the area. The company that owns spur line appears to be actively attempting to market their services, but they have been doing so for a couple of years without much success.

Bulk storage of various types of alfalfa hay for shipment both to the Orient and to East Coast race track owners has been discussed.

There is a very small discussion of using some land in the area for an unload/load zone for taconite which would come from a now abandoned iron ore mine 60 miles to the south.

A representative of a chemical company has been here to look the area as one of 6 or 8 potential areas for a fertilizer plant. I am uncertain as to whether that will ever take place as their water consumption is a bit high for what the availability of water is in the area.

IT MUST BE REMEMBERED that NEW Corp property is 2700 acres which would provide for substantial buffer zones, location of related businesses nearby, and for protection from any other type of industry.

8. Describe current air quality of the site, site vicinity and region.

Response: Air quality is virtually pristine. See Exhibit F.

9. Describe current water quality of any rivers, streams or other bodies of water in the vicinity of the site and the transportation corridor(s).

11

Exhibit F.40 (continued)

Response: Water quality is virtually pristine. Boysen Dam is all snow melt and rainwater accumulation with only the waste water effluent off some fields as a contaminate. Bad Water Creek that runs along side the Burlington Northern Mainline runs only four months of the year and is a dry sand bed the balance of the year. (There is no short term method by which NEW Corp can obtain any background radiation statistics.) See Exhibit G.

10. Provide information on background radiation for site and site vicinity.

Response: Gas Hills is a historic uranium mining and milling area located 70 miles south by southeast, as the crow flies. The tailings, mills and other areas have been subject to clean and restoration and radiation control.

IX. DEMOGRAPHY

1. What is the permanent and transient population within 10 miles of the proposed site? If available, provide population by 22-1/2 degree sectors at distances 1, 2, 3, 4, 5 and 10 miles from site.

Response: The area open terrain Wyoming high desert with very little population. The town of Shoshoni has 500 (plus or minus) people and that would be constant, year and year out. It is one mile from the proposed site.

Within ten miles of the proposed site, the only other population would be farmers and ranchers and that would total approximately 1000 people, including Shoshoni.

Riverton is 24 miles from the site and would be the first center of any substantial greater population.

2. Identify all towns and cities within 10 miles of the site.

Response: Please see 1 above.

3. Provide any available information on the population projections for future years for the 10 mile radius around the site and for all towns and cities within 20 miles of the site.

Response: Population projections for Shoshoni in the 10 miles radius are not in existence. I would assume that since Shoshoni has been the same size for the

12

Exhibit F.40 (continued)

last 20 years and there is nothing other than this project on the horizon for the area, this project would the dominate population shift.

Most people, however, would live in Riverton and commute the 24 miles.

Riverton is 24 miles away and is a town of 13,500 people. (The entire County is 40,000 people). Riverton probably shows a projected growth of 3% per year at best.

4. What is the permanent and transient population within 10 miles of the transportation corridor(s)(to the extent that this is outside the area described in IX 1. above.)

Response: The population growth along the transportation corridor(s) is not expected to be substantial. i. e. One or two houses per year at best.

X. METEOROLOGICAL/CLIMATOLOGICAL CONDITIONS

1. Provide information on the frequency and severity of any severe weather conditions (e.g. tornadoes, lightning, sever winds) that may be experience at the site which could potentially damage or affect the safe operation of the ISFSI facility.

Response: The site is approximately 10 miles as the crow flies from the Owl Creek Mountain Range. Some wind storms due occur against the Range with some lightening. It is not serious or substantial as to its frequency. Although once or twice a year a lightening storm may take place within 10 miles site. Tornadoes are not unheard of but this writer has lived here for 47 years and has never seen one nor heard of one in that area.

Severe winds for that area would be gusts of 30 or 40 miles an hour, perhaps three times a year in the springtime.

2. Provide information on weather conditions (e.g. winter storms/snow falls) that could significantly impede site access and operations during substantial portions of the year.

Response: The Burlington Northern train runs year around and therefore access to the site from the Burlington Northern and the spur line would not be impeded by any winter storms or at least historically they have not affected Burlington Northern activity.

13

Exhibit F.40 (continued)

The State Highway (20-26) and the County road off the highway to the site are open year around and would not impede access to the site.

XI. NATURAL/MAN-MADE HAZARDS

1. Provide information (e.g. type, severity, location, frequency,) on any natural hazards, not describe above, that could affect the site and potentially damage or affect the safe operation of the ISFSI facility.

Response: None known

2. Provide information (e.g., type, severity, location, frequency) on any man-made hazards that could affect the site and potentially damage or affect the safe operation of the ISFSI facility.

Response: None known

XII. SITE DEVELOPMENT COSTS

1. Provide information on the amount and difficulty of clearing and grading the proposed site for construction of the proposed ISFSI, including the likely need for rock blasting and import of fill from off site.

Response: All of the land has a gentle slope to it (1 to 3 degrees) Land leveling would be a necessity for a perfectly flat location. <u>However,</u> the soil is a sandy soil and amenable to easy modification by regular earth moving equipment.

It is probably recommended that an earthen berm around the facility be raised to serve as eye-sight shield only. No rock blasting would be needed and there is certainly plenty of dirt available both within the anticipated 200 acres and directly adjacent and off site to fill any potential needs.

2. Provide information on any dwellings, businesses, road and any other structures or infrastructures that may need to be relocated from the proposed site or the proposed rail and highway corridors to the site.

Response: There is only at best three residence which would need to be relocated. They are all at a distance outside of a 200 acre buffer area. However, if it became advisable, there are three locations, none of which are

14

Exhibit F.40 (continued)

extraordinarily expensive to rebuild, which may bear review for purchase and relocations. There are no businesses that would need such consideration.

3. Provide information concerning any significant environmental mitigation features (wetlands restoration, surface water diversion and runoff collection, cleanup of contaminants from prior land use) that may be necessary for construction of an ISFSI at the proposed site or of the proposed rail and highway access to the site.

Response: There are no environmental mitigation features which are currently anticipated. If the LLC wished to build a retention pond to collect rain and runoff off the higher bluff to the east would be optional but certainly not anything that should be required.

There are no environmental spills of any kind in the area as it has never been used for industrial purposes.

4. Provide information on the availability of electrical services for the proposed site.

Response: Pacific Power and Light (PacifiCorp) has the franchise to serve electricity in the area and has the capacity to bring whatever necessary service either from the Town of Shoshoni or across the Bad Water and up to the site.

5. Provide information relevant to developing infrastructure on site for the provision of other services (e.g. water and sewage.)

Response: Sewage facilities for human waste would be most likely taken care through a septic system which given the soil conditions would work ideally.

Drinking water could be obtain through either extension of the water line from the Town of Shoshoni or the drilling a water well on the site.

Industrial use of water, depending on the volume, would most likely come from the Shoshoni water lines or an additional water well.

6. Provide information on any unique conditions or characteristics of the proposed site and the surrounding region, not described above, that could affect the licensing, construction or operation of an ISFSI at the site.

Response: The site is accessible directly from the Burlington Northern and the Bad Water railroad lines. The Bad Water line currently is a 100 pound

15

Exhibit F.40 (continued)

line. No state or federal lands needs to be crossed in order to get to the site either from the Highway or from the railroad tracks. Because of the very large overall acreage around the site, placement of the specific 200 acre facility could be done with substantial ease.

XIII. SOCIO-ECONOMIC CONSIDERATIONS.

1. Provide information on availability of, and proximity to, potential work force.
2. Provide information on distance to, and availability of, housing for work force.
3. Provide information on impact of work force on schools, public services, utilities, etc.

Response: Fremont County currently has a 7% unemployment rate. We have 1500 people who are "under employed" in all fields of work which would apply to this project. Housing is available in Shoshoni in rural settings and in Riverton sufficient to handle the needs of the work force. The school system in Shoshoni is excellent and should not need upgrading for this work force nor should the schools in Riverton.

No substantial impact on public services or utilities should be made by this project.

Exhibit F.41

RESPONSE TO THE SITE SELECTION QUESTIONNAIRE

FOR

AN INDEPENDENT SPENT FUEL STORAGE INSTALLATION

I. LOCATION

1. The UNC proposed site is located in Mc Kinley County, New Mexico.

2. The site is 878 acres. UNC operated a uranium mill on the site through 1982. The tailings area is a Superfund site and is within two years of complete remediation. The tailings area is graded nearly level and the NRC and EPA approved remediation plan will assure 1000 years stability. There are additional areas currently used for working buildings and machinery storage which are suitable for construction of a transfer facility.

3. Two site maps are attached and identified as Exhibit A. The Santa Fe Railroad runs a mainline parallel to Interstate 40 shown on the map. State highway 566 shown is direct to the proposed site. There are a number of other maps and charts of various types and for specific purposes of explanation included among other exhibits.

II. HOST JURISDICTION ACCEPTANCE

1. The proposed site is located in Mc Kinley County, New Mexico.

2. No change in jurisdiction is anticipated prior to licensing construction or operation of the ISFSI.

3. UNC has successfully remediated this property under the scrutiny of the local media, the local Native American Tribes, the NRC and the EPA. In addition to this site, UNC has a successful history of restoring nuclear sites to environmentally sound conditions and converting the sites to public use and planned private residential, recreational, and industrial use.

   UNC was a manufacturer of submarine nuclear reactors for over twenty years at a Connecticut plant. In 1990, UNC reached agreement with the Department of Energy to close the plant due to insufficient new submarine production. After closing in 1991, the site was reclaimed with proper remediation completed. The NRC terminated its license for the site in June of 1994. The Connecticut EPA cleared the site for "public" use in 1995. In 1993, UNC entered into a contract with the Mohegan Indian tribe for

Exhibit F.41 (continued)

the sale of the property. UNC was directly involved with the Bureau of Indian Affairs which eventually allowed the Department of Interior to take the property into "trust" for the Mohegan tribe. In addition, negotiations involved two successive governors of Connecticut, the first of whom favored, and the second of whom opposed the tribal operations. As a result of these negotiations, the sale was completed and a public gaming facility is under construction and will open in the near future.

UNC also operated a uranium reprocessing facility in Rhode Island. At the conclusion of operations, this land was restored to pristine conditions and is currently planned for development as a well balanced community, integrated with existing natural systems. The proposed development is described in Exhibit B. The associated NRC license was terminated in the fall of 1995.

Should this site be selected as the ISFSI, UNC will engage a New Mexico public relations firm to assist in a public education and awareness program, stressing the inherent safety of an ISFSI and the substantial economic benefits accruing to the local community when they host such a site. This program would be similar to efforts made in Connecticut and Rhode Island. UNC believes the Church Rock site meets all the technical criteria for an ISFSI and recognizes public and political support will be essential for the successful siting of an ISFSI at its location..

UNC will also, with the concurrence of the L.L.C. , form a citizens advisory committee comprised of New Mexico citizens of note. The members will have credibility with the populace and the media, will be scientifically oriented, and will have representatives from Native Americans, the environmentally concerned, academia, and prominent citizens. This committee will be provided with appropriate technical data, nuclear background information, and will be invited to visit successful spent fuel storage sites in foreign countries. They will be asked to adhere to a limited time schedule and prepare and release a report to the people of New Mexico on the net benefits of an ISFSI. The committee members will be volunteers, but their expenses related to this work will be paid.

A video tape will be prepared. This tape will explain the project to be undertaken, the safety measures which will be in place, and a general explanation of the benefits accruing to the locale in which the site is located. The tape will also serve as a primer in understanding nuclear energy so as to remove the element of fear of the unknown. Dramatic comparisons of the inherent safety and cleanliness of nuclear energy as compared to fossil fuel generated power, and even other industries such as transportation will be portrayed. For example, we may show the enormous benefits of air travel, including bringing families and friends together, supporting world commerce, providing emergency medical and health benefits and bringing prosperity

2

Exhibit F.41 (continued)

to involved communities. We can then show the air pollution and the noise pollution created by airplanes, the safety record of air travel as compared to nuclear energy and ask the question "should we ban all aircraft from the planet?". We can also show the benefits provided by fossil fuels and look at the pollution caused by them. A comparison of safety records of nuclear versus fossil fuel will favor nuclear energy. Again the question of banning fossil fuels can be asked. The major point made will be, once there is a basic understanding of nuclear energy, the safety measures to be taken, and the economic benefit associated with an ISFSI, it makes no more sense to oppose nuclear installations than it does to oppose other accepted industries. This tape will address the propaganda and misinformation disseminated by the extremist groups opposed to siting an ISFSI anywhere. The tape will be shown to local citizens groups in New Mexico, Native American groups, civic clubs, and will be available for showing on both commercial and public broadcasting television stations.

UNC will also exercise its working relationships with the key political figures in the local, state, and federal governments. Our strategy will be to seek positions of non-opposition and to avoid any possible embarrassment prior to the November elections. Our outside counsel in this matter is experienced in nuclear matters, general energy matters, and includes a former NRC Commissioner and a current advisor to the Secretary of Energy.

4. There are no residents within one and one half miles of the proposed site. The population density of Mc Kinley county is 11.2 people per square mile as compared to an average of 68.6 people per square mile throughout the United States. No polls have been conducted among the populace of Mc Kinley county, but UNC is prepared to conduct such polls upon selection of Church Rock as the ISFSI.

5. We have not found any regulatory impediments to construction and operation of an ISFSI at the UNC site, and will continue a current and comprehensive review of all germane regulations.

6. UNC has been subjected to intense scrutiny by the New Mexico media since the closing of our mine and milling operation in 1982. Strict adherence to NRC and EPA reclamation criteria and conscientious meeting and improvement upon agreed schedules has earned the respect of the local media for the efforts made. Utilization of a first rate New Mexico public relations firm and inclusion of the local media in our educational and awareness program will generate reasonable support once the safety of the operation and the economic benefits are known and understood. We are, of course, aware of and have copies of most of the media coverage generated by the Mescalero negotiations.

3

Exhibit F.41 (continued)

III. SITE OWNERSHIP

1. United Nuclear Corporation, a wholly owned subsidiary of UNC Incorporated, owns the site. The Santa Fe Railroad owns and operates the main railroad line within ten miles of the site. Should a spur be constructed to the site, the right of way alongside State Highway 566 would be the logical path and ownership of that land is spread among the Federal government, State government, and several private entities.

2. The title may be transferred to an entity as required by any agreement between Private Fuel Storage, L.L.C. and UNC Incorporated.

3. The site is owned by UNC.

IV. TRANSPORTATION ACCESS

1. (a) The Santa Fe main line runs east/west ten miles south of the site.

   (b) A rail spur does not exist currently.

   (c) The logical right of way for a rail spur would parallel State Highway 566 directly to the site. The route would pass through land owned by the Federal government, State government, and several private entities.

   (d) Should a rail spur be found more economic than use of State Highway 566, the grading and route would be straightforward.

2. (a) Interstate Highway 40 runs east/west ten miles south of the site. State Highway 566 runs from I-40 directly to the site.

   (b) The existing highways are suitable for heavy truck loading and have already been used for such.

   (c) Suitable highways do exist.

   (d) State Highway 566 is capable and has been used for heavy truck transport from both the Santa Fe railroad and I-40 for the ten miles direct to the site.

V. SEISMOLOGY

1. Exhibit C, section 2.5 includes copies of seismic analyses of the site vicinity and surrounding region.

4

Exhibit F.41 (continued)

2. (a), (b), & (c)

3. (a), (b), & (c)

4. Detailed information pertaining to questions 2,3 & 4 are found in Exhibit C, section 2.5 and D, section B4.3

5. The proposed site does not lie within the range of strong near-field ground motion from historical earthquakes on large capable faults.

VI. GEOLOGY/SOILS

1. See Exhibit E sections 1.0 and 2.0
2. See Exhibit E sections 1.0 and 2.0
3. See Exhibit E sections 1.0 and 2.0
4. See Exhibit E sections 1.0 and 2.0

VII. HYDROLOGY

1. Detailed data in response to ground water analysis can be found in Exhibits D, E, & F. There is no surface water at the site.

2. A Probable Maximum Flood (PMF) has been calculated for the site. Exhibit G shows the limits of the PMF. While a portion of the site is below the PMF elevation, sufficient acreage remains for construction of an ISFSI.

3. Additional study is required to respond to this question.

4. There are no wetlands in the area or in the transportation corridor.

5. The site is not subject to flooding. The site is transected by a natural ephemeral drainage known as pipeline arroyo. Under normal conditions this drainage way is dry and contains water only during precipitation.

6. See Exhibit E, section 3.0

VIII. ENVIRONMENTAL CONDITIONS

Exhibit F.41 (continued)

1. Exhibit C provides the analyses requested.
2. There are no known endangered or threatened plant or animal species in the site, the transportation corridors, the site vicinity or the region.
3. See Exhibit C, section 2.3
4. See Exhibit C, section 2.3
5. There are no recreational facilities within ten miles of the facility or the adjacent transportation corridor.
6. The site is currently being reclaimed after use as a uranium milling facility ceased in 1982. The transportation corridor is a state highway. There is some grazing of cattle and sheep in immediate juxtaposition to the site.
7. The site has no future planned land use. It will remain as a remediated uranium tailings site. The surrounding land is sparsely populated and is used for some grazing. No change in this use is anticipated. The nearest residence is over 1.5 miles from the site.
8. The air quality of the site, the site vicinity and the region is excellent.
9. See Exhibit C, section 2.6
10. See Exhibit C, section 2.9

IX. DEMOGRAPHY

1. See Attachment H, section A.19
2. There are no towns or cities within ten miles of the proposed site.
3. There has been no significant change in the population within five miles of the site for the last 15 years. There is no reason to expect any significant change within the foreseeable future.
4. Attachment H covers half the transportation corridor, and the other half has a population density similar to that of the rest of Mc Kinley county.

X. METEOROLOGICAL/CLIMATOLOGICAL CONDITIONS

Exhibit F.41 (continued)

1. See Exhibit C, section 2.7

2. See Exhibit C, section 2.7

XI. NATURAL/MAN MADE HAZARDS

1. There are no natural hazards not described above that could affect the site and potentially damage or affect the safe operation of the ISFSI.

2. There are no man-made hazards that could affect the site and potentially damage or affect the safe operation of the ISFSI.

XII. SITE DEVELOPMENT COSTS

1. The site is already cleared and the grading for installation of the complete ISFSI would be minimal. Over three hundred acres of the land has been graded nearly level with drainage planned to withstand a thousand year flood. No blasting or importation of fill would be required.

2. There is no need for any relocation of dwellings, businesses, roads, or any other structures or infrastructures at the proposed site or along any transportation corridors to the site.

3. Comprehensive environmental studies of the site prior to mining and milling and after shutdown had not revealed any wetlands restoration, surface water diversion and runoff collection which would preclude ISFSI operations. The site is a Superfund site and total reclamation is being accomplished in full accord with all NRC and EPA requirements. UNC does not anticipate any ISFSI owner/operator liabilities being attached. Reclamation efforts will be complete in less than two years and, in any event, UNC would be willing to indemnify such participant(s) against any such liability.

4. Electricity to the site is in place and provided by Public Service of New Mexico.

5. Water is provided by private wells and sewerage is treated in septic tanks. The septic tanks would require enlargement for an ISFSI operation.

6. UNC is not aware of any unique conditions or characteristics of the proposed site and surrounding region, not described above, that could affect the licensing, construction,

7

Exhibit F.41 (continued)

or operation of an ISFSI at the site.

XIII. SOCIO-ECONOMIC CONSIDERATIONS

1. UNC currently employs eleven people at its Church Rock site. During peak operations in 1980, approximately 1500 persons of varied skills were employed by UNC at the site. There has been little change in the area population since that time.

2. The city of Gallup (population 20,000) is seventeen miles from Church Rock.
The city of Grants (population 20,000) is sixty miles from Church Rock.
The city of Albuquerque (population 500,000) is one hundred and forty miles from Church Rock.

3. There should be no impact on area schools, public services, utilities, etc. from the operation of an ISFSI at Church Rock.

NRC FORM 335
(2-89)
NRCM 1102,
3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

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(Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.)

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Final Environmental Impact Statement for the Construction and Operation of an I ndependent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute indians and the Related Transportation Facility in Tooele County, Utah

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Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

9. SPONSORING ORGANIZATION - NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

Same as above

10. SUPPLEMENTARY NOTES

U.S. Bureau of land Management, U.S. Bureau of Indian Affairs, and U.S. Surface Transportation Board are cooperating agencies

11. ABSTRACT *(200 words or less)*

Private Fuel Storage, L.L.C. (PFS), proposes to construct and operate an indepe ndent spent fuel storage installation on the Reservation of the Skull Valley Band of Goshute Indians. The Reservation is lo cated geographically within Tooele County, Utah. Spent nuclear fuel (SNF) would be transported by rail from existing U.S. commercial reactor sites to Skull Valley. To transport the SNF from the existing rail line to the proposed facility, PFS pro posed to construct and operate a rail siding and a 51 im (32mile) rail line from the rail line near Low, Utah to the reservation.

This final environmental impact statement evaluates the potential environmental impacts of the PFS proposal. The document discusses the purpose and need for the PFS proposed facility, describes the pro posed action and its reasonable alternatives, describes the environment potentially affected by the proposal, presents and co mpares the potential environmental impacts resulting from the proposed action and its alternatives, and identifies mitigat ion measures that could eliminate or lessen the potential environmental impacts.

The PFS proposal requires approval from four federal agencies: the U. S. Nuclea r Regulatory Commission, the U.S. Department of Interior's Bureau of Indian Affairs and Bureau of Land Management, and the U.S. Surface Transportation Board. The actions required of these agencies are administrative. The environmental issues that each of these agencies must evaluate pursuant to the National Environmental Policy Act of 1969 (NEPA) are i nterrelated; therefore; the agencies have cooperated in the preparation of this final environmental impact statement, and this document serves to satisfy each agency's statutory responsibilities under NEPA.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

Private Fuel Storage, PFS, Skull Valley Band of Goshute Indians, ISFSI, Skull V alley, Utah, independent spent fuel sotrage installation, FEIS

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